Concept note: Developing a model for inclusive education and assistive technology appropriate for teaching and learning contexts in developing countries

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At a discussion between GeSCI and members of the Ghana Education Service (GES) Special Education Division (SpED) in July 2007, it was agreed that GeSCI would explore Assistive Technologies for Special Educational Needs in order to better support the requests from the SpED.

In order to provide context on the role of Assistive Technologies in Special Education, this paper starts by reviewing the development of education provision for children with Special Educational Needs (SEN) in Ghana and the factors which have influenced current policy thrust toward Inclusive Education (IE) supported by Assistive Technologies (AT). It follows by highlighting the view that IE represents an innovative model for SEN provision which can bring benefits to both children with SEN and their non-SEN peers. Inherent in the IE movement is the understanding that assistance should not only focus on children with SEN, but on whole school improvement in order to remove barriers that prevent learning for all students. The paper reflects on the gap between the model of IE that is being striven for and the current model of provision and the critical contribution that ICT or AT can make as a means for bridging that gap. Its aim is to encourage thinking and discussion about the future direction for the development of an IE model in direct response to Ghanaian needs, but which would contain principles and elements that could be applied to any developing country context.

Background

It is important to acknowledge the significant developments in special education provision that have taken place within the education system of Ghana. The special education movement can be traced back to the 1930s when the first special education services were set up to cater for students with visual impairment. Missionaries and philanthropists were among the first providers and the movement led gradually to the establishment of special schools for visually and hearing impaired students throughout the 1940s and 1950s. The Wilson Committee appointed by the government in 1960 recommended the inclusion of these schools under the authority of the Ministry of Education (MoE).

Services for students with general learning difficulties developed from the 1960s as a result of lobbying from parents´ groups. By the 1970s and 1980s Special Education Needs (SEN) provision had entered a phase of rapid growth with the establishment of

special schools in every region. In 1976 a Special Education Unit, later to become the Special Education Division (SpED) of the Ghana Education Services (GES), was established and charged with the provision of educational facilities and services for children and youth with disabilities and SEN.

From 1968 the first attempts were made at integration of visually impaired students in mainstream schools at secondary and tertiary levels. The 1990s saw a continuous growth in the integration of visually impaired students and the piloting of community-based rehabilitation (CBR) programmes for persons with disabilities through the mobilization of resources at community level and the assistance of NGOs.[1]

However considerable work is still needed to ensure that the majority of children with SEN in Ghana receive education in order to become fully productive and integrated citizens. Estimates from the Ministry of Manpower Development and Employment suggest that less than 2% of children with SEN and/or a disability are serviced through special schools and that children who gain access to these schools are primarily residing in urban areas.[2] The inclusive education programmes for the visually impaired reach out to less than 1% of the primary school age population.[3] One of the greatest challenges facing the sub sector is the limited resources available for the development and improvement of special education. The majority of funding available is used to provide institutional care in the form of food for children in special schools.[4]

One cost effective approach in reaching larger numbers of children with SEN would be the systematic expansion of the inclusive programmes where students are enrolled into mainstream classes with additional support. The Ministry of Education Science and Sports (MOESS) is committed to the introduction of an inclusive education policy, which gradually mainstreams children with SEN and limits access to special schools only to the severely disabled. The Education Strategic Plan (ESP) 2003-2015 of the MOESS has adopted inclusive education as the main policy which will inform the future direction for special educational provision in the country and which will constitute a way of achieving Education For All.[5]

The MOESS is also currently in the process of developing a comprehensive policy for the integration of ICT across the education sector. In their review of good practice in ICT and Special Education Needs for Africa, Dr. Leslie Casely-Hayward and Paul Lynch (2003a) considered that the use of ICT and Assistive Technology could help "reduce the burden special education places on educational departments and should build workable sustainable solutions that can enhance student's ability to perform at his or her highest potential". In their follow-up study on ICT solutions for SEN in Ghana (2003b), the authors indicated that Ghana had the opportunity to become the "leading country in Africa in terms of its delivery of an enhanced learning environment for children and

[1] Ghana Education Service: Special Educational Division, 2005, Historical Background
[2] Ministry of Employment and Social Welfare, 2000; quoted in Casely-Hayward and Lynch, 2003b:11
[3] Oxfam Education Report, 2002: quoted in Casely-Hayward and Lynch, 2003a:19
[4] Casely-Hayward and Lynch, 2003b:17
[5] Ghana Education Service: Special Education Division, 2005

adults who require special educational support". The challenge is how to convert this potential into reality on the ground.

Where does Inclusive Education fit in? Inclusive Education as a Human Right

The Universal Declaration of Human Rights (1949), the United Nations General Assembly Charter (1959) and the United Nations Convention on the Rights of the Child (1989) all acknowledged education as a human right. The World Conference on Education for All (1990) and the United Standard Rules on the Equalization of Opportunities for Persons with Disabilities (1993) re-stated that education is a basic right for *all* people and recognized that particular groups were excluded. The Salamanca Statement and Framework for Action on Special Needs Education (1994) questioned where special education should be placed in relation to Education for All (EFA), and called for "inclusion" in mainstream education to be the norm so that all children have the opportunity to learn - together.[6] The Dakar World Education Forum (2000) placed a great emphasis on promoting girl's access to schools. However there was no specific mention of disabled children although the term "inclusive" does appear in the framework for action in which governments and other agencies pledged to: "Create safe, healthy, inclusive and equitably resourced educational environments conducive to excellence in learning with clearly defined levels of achievement for all".(Article 8)[7]

The Millennium Development Goals endorsed at the UN Millennium Development Summit (September 2000) targeted the eradication of extreme poverty and hunger and the achievement of universal primary education as its first two goals. Inclusive Education (IE) offers a strategy for reaching disabled children and adults and other marginalized or at risk groups, who normally constitute the poorest of the poor in developing countries. IE is about both getting children *into* and *through* school by developing schools that are responsive to the actual, diverse needs of children and communities. IE is therefore about both access and quality and is a means for achieving these fundamental aspirations as highlighted in the EFA and MDG action frameworks.[8]

These international treaties and others have been ratified by Ghana and have informed the Government's direction on special educational provision as entrenched in the country's 1992 Constitution and also declared in the Children's Act of 1998 which stipulates under Article 560, section 10 that "a disabled child has a right to special care, education and training wherever possible to develop his maximum potential and be self-reliant".[9]

[6] Peters, 2004
[7] Dakar Framework for Action: quoted in Stubbs, 2002:13
[8] Stubbs, 2002
[9] Children's Act, 1998: quoted in Ghana Education Service: Special Education Division, 2005:4

Definition of Inclusive Education

Inclusive Education (IE) is defined as a process of addressing and responding to the diversity of needs of all learners through increasing participation in learning, cultures and communities and of reducing exclusion within education.[10]

Inclusion in this definition is about much more than the location in which the education takes place. The emphasis is on a process view of inclusion which "facilitates flexibility of response with the priority focus on what is in the best interest of the child/ young person involved".[11]

Definition of Assistive Technology

Assistive Technology (AT) has been around for hundreds of years and is used to describe both the products and the services for people with special needs. Casely-Hayward and Lynch (2003) consider the most commonly quoted definition to be derived from American Legislation:

> *"The Assistive Technology Act (1998) and the IDEA (Amended 1997) define an AT device as any item, piece of equipment, or product system (whether acquired off the shelf, modified, or customized) that is used to increase, maintain or improve the functional capability of an individual with disability. AT devices may be categorized as no technology, low technology, or high technology."*[12]

While AT can help overcome some of the functional barriers created by disability, it can also create new barriers if not matched carefully with individual needs. In an inclusive education context the effective integration of AT devices to enable learning would require an assessment process with two objectives: (1) to assess the needs of the learner and (2) to access resources in order to meet those needs.[13]

What is the understanding of IE in Policy, Strategy and Planning Frameworks?

The vision of the MOESS for providing equitable educational opportunities for all children includes persons with Special Educational Needs. The aim of the ESP is that by 2015 all children of school-going age, including those with special educational requirements, will complete primary schooling. The decongestion of special schools was a crucial issue for the designers of the ESP. Children in special schools would be screened to determine their levels of disability or impairment as a method to hasten the inclusive education process.[14] The IE strategy defined in the SpED´s policy framework focuses on the adoption of a social model for special educational provision which will gradually replace the current medical model.

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[10] UNESCO, 2004b
[11] NCSE, 2006:23
[12] LD Online, 2001; quoted in Casely-Hayward and Lynch, October 2003:7
[13] Winter, Fletcher-Cambell, Connolly and Lynch, 2006: quoted in NCSE, 2006
[14] Ministry of Education, 2001: quoted in Casely-Hayward and Lynch, 2003b

Inclusion as a new strategy

Educational provision within the special education sector has been built around the **medical model of segregation** where the blind, deaf or mentally handicapped were educated in special boarding schools located in the outskirts of towns, separated from society. This medical model contrasts with the **social model** which encourages learners with disabilities to be included in mainstream schools to become active members of their society.[15]

The strategy represents a shift in thinking on education provision for students with SEN in Ghana and presents the opportunity for those with special needs to benefit from and participate in mainstream education and to achieve meaningful outcomes in terms of their active participation in society. What is not apparent in the strategy is whether there is a clear understanding of the fundamental change involved in adopting the social model and the challenging nature of the response which would be required from the MOESS and the multiplicity of stakeholders in education, if the vision inherent in the strategy is to be operationalized. The medical model focused on the learner with SEN who needed fixing ("this child has learning difficulties"). The envisaged social model will shift the focus from the difficulties of the learner to everything that happens in the classroom and school environment which can create barriers to learning ("this classroom/school is set up in such a way that it is difficult to learn").[16]

Ainscow (2004) considers that the social model view constitutes a radical way of thinking and is based on the premise that *all* learners can experience difficulties in school, but that these difficulties can provide opportunities for improvement. This "social" or "curricular" view is very dependent on teachers being encouraged and trained to use "curriculum differentiation" to modify content, activities and assessments in order to respond more flexibly to the diverse learning needs of students.[17] Evidence suggests that IE provision can improve the performance of non-SEN students, in part because the increased attention on classroom practices with regard to "pedagogy and curriculum adaptation (for SEN students) generalizes teaching skills to all students".[18]

In essence the implementation of an Inclusive Education strategy could "raise the bar" for both special and mainstream education provision in Ghana. Rather than being a marginal theme on how some learners can be separated from or integrated into the mainstream, inclusive education is an approach that seeks to transform teaching and learning for the benefit of all learners. Implementation will require fundamental cultural, attitudinal and societal change. The change agenda cannot solely be driven by the GES SpED, but will require changes on the part of teachers, principals, parents, communities, administrators, representative bodies, NGOs and other stakeholder interests.

[15] Ghana Education Service: Special Education Division, 2005:2
[16] Abbott, n.d.:10
[17] Perner and Ahuja, 2004: Ainscow, 2004
[18] Peters, 2004:12

What are the main issues with regard to developing a model for IE and AT in Ghana?

Lynch (2007) cautions that Inclusive Education cannot be considered as a 'model' that can be built and delivered in one go. It represents in many ways a vision that stakeholders will constantly strive towards and which will evolve gradually alongside implementation through continuous processes of national debate and reflection.

There is a need for a pragmatic and realistic approach, which concentrates on leveraging the SEN provision base which exists to achieve the next steps towards IE provision. According to Ainscow[19] the key to implementation is to concentrate on high impact levers for change. He considers that much of the work should focus on how to bring about change in the classroom, in the school environment and in the community in relation to what goes on in the school. He identifies the five factors of school review and development, evaluation, school principles, community, and education departments as being high impact levers for change.

The critical issues presented in this paper centre on high impact levers for change towards "inclusive" classroom and school environments and the realities of current SEN provision in Ghana. The issues related to the levers for change have been identified by Susan Peters (2004) as a result of her review of international best practice at micro-level (schools and communities), where IE initiatives and implementation originate. The issues arising from current SEN provision in Ghana are based on findings from the study on ICT based solutions for SEN in Ghana carried out by Dr. Leslie Casely-Hayward and Paul Lynch (2003b). The purpose is to consider the nature of the gap between the "inclusive model" that is being striven for and the reality of the "current model" of SEN provision and to consider the potential of the recommendations for ICT or AT interventions to bridge that gap.

The issues and recommendations for ICT interventions are set out in the table below and are not intended to be either definitive or exhaustive. They serve to illustrate the challenges which are involved in IE delivery and the types of issues which will require further debate, reflection and consensus building in order to develop a successful and sustainable IE model in Ghana.

Issues related to high impact levers for developing the 'inclusive model' for SEN provision	**Issues arising from the current model of SEN provision in Ghana**	**ICT or AT Based Solutions for SEN provision in Ghana** Key recommendations for funding and further development
School Review and Development The literature stresses that IE as a guiding philosophy enacted through policy /practice will require comprehensive school restructuring. This restructuring should be supported by changes in **beliefs, methods** and **resource allocations** at all levels of educational systems and governance.		

[19] In UNESCO, 2004:35

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Beliefs Whole-School Restructuring programmes can have high leverage: • when IE principles and practices are considered as driving reform as well as integral to reform, and not an add-on program • when diversity and individual differences as well as similarities are recognized and valued, not 'tolerated' or 'accepted'. Diversity becomes a common denominator, not an individual numerator. • when new roles and responsibilities are clearly identified, and all staff systematically prepared for these new roles and provided with adequate supports • when individualized education is considered a universal right and not a special education need • when school reform includes active involvement and participation of community members, parents and students • when there is a strong focus on school leadership development and recognition of the instrumental role of school principles in determining the value base of the school	• The most striking challenge related to the integration of students into the mainstream is stigmatisation. • The survey reveals a negative attitude of peers, some teachers and even parents towards children with disabilities (CWD). • Children with SEN in large mainstream schools receive less attention • Teachers reject or neglect children with visual and hearing impairments and with learning difficulties • Some parents of non-CWD children believe that their children's learning capabilities may be slowed if CWD children are integrated	• Identify one region of the country for an intensive programme of inclusive education each year for the next ten years. This would entail the selection of 5 – 10 schools per district in each region. • Set up adequate sensitisation activities through key media agencies and NGOs working in the field of disability (e.g.VSO, ADD, etc.) • Collaborate with the Department of Social Welfare and the CBR in a major campaign to demystify the stigma attached to the pejorative labels as well as the magical or religious models of disability placed upon individuals.
Methods Training and professional development are central to IE practice in countries of the North and South. Teacher education programmes can have high leverage: • when special and general teacher education are integrated and or/complimentary • when teachers learn innovative child-centred strategies to teach a diverse range of abilities, as well as strategies to promote active student learning and adaptations to meet individual students needs • when teachers learn curriculum development strategies that encompass broad common goals, facilitate flexible structure, provide alternative/multiple assessments based on individual progress; address cultural /religious /linguistic diversity of the learners, and content, knowledge and skills are relevant to learners´ lived experiences.	• There is not enough pre-and in-service training being dedicated to equip all mainstream teachers to deal effectively with children with SEN • Teachers pursuing diploma or degree courses in special education at the University of Winneba (UEW) often do not go back to serve in schools on completion. • There is on-going recruitment of untrained teachers to address problems of inadequate supply and high attrition, especially in rural areas. • BEd specialist courses are insufficiently developed and lack adequate experiences in real teaching and learning	• Assist all colleges to adopt an ICT enhanced improved mixed model (open and distance learning and face to face) pre and in-service • Mainstream UNESCO Special Education Training Packs[20] in the Teacher Training Colleges in all regions in order to prepare and familiarise all teachers before posting to schools. • Use the UNESCO packs in all Special In-Service programmes to upgrade teachers at the cluster level by means of the Whole School Development programme In-Service model. • Mainstream training in ICT skills which will enhance teaching ability to work with students with mild/moderate learning disability or sensory impairment • Make SEN and ICT modules and materials (videos, tape cassettes, CD ROMs and Braille) available on ODL courses through the Distance Teacher Education

[20] UNESCO, 1993; UNESCO, 2001; UNESCO, 2004a

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• when teacher training provides hands – on experiences and opportunities for critical reflection as well as continuous on-going feedback and support in classrooms.	environments • Mainstream teachers have had little contact with low, medium or high technology (see annex 1) during their training years at the TTCs or in In-service training programmes. • There is a lack of trained sign language teachers in Ghanaian Sign Language (GSL)	programme. • Develop ODL training for University and teacher training college levels on the fundamentals and implementation of assistive technologies (link with free online courses[21]). • .Promote usage on television, by teacher education institutions and UEW of the video and interactive CD ROM developed for teaching sign language • Train teachers in Assistive Technology usage through regular training programmes organised by the SpED with the support of outside agencies • Call on private sector ICT training companies to provide initial In-Service training in how to use computer software to teach or supplement curriculum areas in SEN • Encourage TTCs to subscribe to online educational supplements and journals (British Journal of Learning Support, Closing the gap USA) to gain more in-depth knowledge of international practices in the field of inclusion.
Resources If schools are to provide "a flexible curriculum" and "adapt routines and the physical environment" they need to have access to materials which will help remove barriers to student learning. Resources can have high leverage: • when local resources are un-locked • when existing resources are distributed • when people (children, parents, teachers, members of marginalized groups) are perceived as key resources • when there is close collaboration with multi-disciplinary team (teachers, parents, resource teachers and any other educational service provider) in order to identify, acquire, create, adapt resources in	• Schools are under-resourced and do not have sufficient learning support materials to help address literacy and numeracy based difficulties which prevent students from accessing the curriculum. • Teachers have poor knowledge of Teaching and Learning Materials and their usage in general • There is little evidence of low to medium technology usage in classrooms • There is inadequate access to assistive technology (hearing aids, reading materials in	• Develop AT in the form of **low to medium** cost technology[22] in Ghana by firms in the country. • Build capacity for the Material Resource Centre Accra to become a key institution for the supply of AT into both mainstream schools and special schools • Provide all of the 110 teacher resource centres in every district in Ghana with AT and technical advice in order to assist teachers. • Make Teacher Resource centres accessible to teachers with disabilities by providing specially adapted benches for wheelchairs, screen reader software and peripheral devices (e.g. joystick, tracker ball, etc.) and by installing "loop systems"[23] into teaching

[21] NCTE, Ireland has 7 free online courses of 20 hours each: ICT & Special Needs:1) The Basics, 2) Learning Support, 3) Mild Learning Disabilities, 4) Moderate/Severe/ Profound Learning Disabilities, 5) Deaf/Hard of Hearing, 6) Introduction to ICT and Visual Impairments, 7) Autistic Spectrum Disorders

[22] **Low cost technology** – Books in Braille, large print books, tactile books and other teaching learning materials (TLMs)

[23] The "loop" is a wire that picks up sound from a microphone and transmits it to an earpiece, or hearing aid, within a loop.

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accordance with the different learners needs, e.g. Braille, assistive devices	Braille) devices • Budgets do not cater for the purchasing of materials for the visually and hearing impaired (tape cassettes, headphones, Braille machines, writing styluses, slates, tactile maps, books in large print, sign language books) • The reliability of basic school infrastructure to support technology is questionable • Computer labs lack capacity and multi-media requirements – CD Rom drive, sound cards and sufficient RAM to incorporate AT software • There is a lack of software that can aid students with responding, attending skills as well as developing hand-eye co-ordination • Low vision students are prevented from attending sessions in computer labs due to absence of screen-magnifier or screen saver software • There are poor storage facilities for materials in schools • There is untimely distribution and insufficient supply of materials from GES SpED • Assistive devices are generally unavailable • Large amounts of equipment have been donated and abandoned in resource rooms due to lack of instruction manuals and training support	labs so that teachers and students with hearing impairments can participate. • House "Schoolnet" for teachers and students to become more informed on state of the art software programmes for architectural drawing and device conception. • Develop demonstration video on the use of Assistive Technology • Prioritize the provision of ICT in all IE pilot schools • Set up email and linkages to existing local communication centres as an alternative to developing in-house computer labs and develop their potential as resources for schools to build their capacity to introduce ICT • Use CD ROMS as an alternative to Internet • Provide "Screen Reader" software at Internet Cafes

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Assessment Assessment issues constitute one of the most significant challenges for IE/EFA. A growing body of research does indicate that IE benefits both SEN students and their peers, and that given the appropriate supports and adapted curriculum, SEN students can do as well or even better than their peers. Assessment and evaluation can have high leverage: • when student assessments measure individual progress in the general education curriculum, with clear standards and benchmarks • when multiple forms of student assessments (formative and summative are used to inform and facilitate teaching and learning) • when school-level evaluation is build-in to program planning • when broad conceptions of student outcomes include mastery of academia skills as well as self-esteem and independent living skills need for active participation in society as adults	• Ghana's National Assessment Centres are in need of urgent attention. Most of the centres are unable to meet the needs of individuals with physical disabilities due to lack of ramps to the building and appropriate acoustics and kits[24] to carry out assessments. • SEN students have problems assessing the mainstream curriculum in its present form • The use of Individual Education Programmes (IEPs)[25] to diagnose the needs of SEN students, plan their learning activities and monitor their progress is not widely known among mainstream teachers • The link between IEPs and the general curriculum has not been clarified	• Establish at least 4 fully equipped and staffed assessment centres outside of Accra and Kumasi. • Equip centres with appropriate assessment materials so that there are standardised and diagnostic tests in all centres for testing hearing, sight and learning disabilities[26] and some examples of low vision aids, hearing aids and Braille kits. • Introduce mobile assessment clinics equipped with correct testing materials to increase the rate of assessments for children in districts • Promote with teachers simple methods of adapting Individual Educational Plans for children with SEN using agreed templates. • Children with low vision, mild to moderate hearing impairments and mild learning difficulties should be mainstreamed with the support of low and medium Assistive Technologies.[27] • Special schools and institutions should be restricted to children diagnosed as having a Profound/Multiple Learning Disabilities. • Hire **Special Needs Coordinators** for the Assessment Centres and build up capacity in the centres to serve both special and mainstream schools in pilot districts.[28] • Post UEW graduates in special education as **Itinerant Teachers** (ITs) to support teachers in school clusters in the districts where mainstreaming is being piloted. All ITs should have the capacity to teach Grade 1 and 2 Braille and Ghanaian sign language.

[24] Multi-Disciplinary Teams (MDT) (e.g. pediatricians, child psychologists, speech and language therapists, occupational therapists, etc) often collaborate closely with building assessment kits. They can contain **low-tech assessment materials** such as puzzles, soft balls, dolls and children's cutlery.

[25] IEPs are used to diagnose the needs of SEN students, set learning targets and tasks and consider which tools (assistive technologies) can aid the student to achieve their targets. The IEPs assist the teacher to identify educational gaps in the learner with SEN, thus enabling effective intervention planning on an ongoing cyclical basis.

[26] **High tech assessment materials** include simple off-the-shelf diagnostic assessment kits, which test a series of emergent development areas in literacy (e.g. visual sequential memory, hand-eye co-operation, five motor skills and phonological processing) to more sophisticated kits that test communication and physical movement (switch assessment).

[27] See appendices 1 and 2

[28] The EAR (Educational Assessment and Resource) Centres in Kenya and Uganda developed with funding from DANIDA, are good examples of an Assessment Centre model which serves special and mainstream schools.

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<u>Community, NGO, and Multi-Sector Participation</u> IE projects can enhance the capacity of schools and communities to provide SEN services through multi-sector collaboration. Driven by severe resource constraints, countries of the South have been especially successful in using this strategy to reduce costs, increase benefits, and reach greater numbers of SEN children and youth. Community involvement increases the likelihood of sustainability. Specifically, the research provides clear evidence that commitment to IE is an essential pre-requisite to success and sustainability. NGOs and INGO donors play important roles in building capacity and sustainability. Community, NGO and Multi-stakeholder participation can have high leverage: • when based on a holistic and rights-based conception of children, beginning with early identification, treatment and child development as important influences on health and well-being, school-readiness • when specific coordination plans, including time-lines, designated lead agencies, clear roles and responsibilities • when active and targeted outreach activities and IE awareness education reach a broad audience in the community, particularly parents • when Disabled Person's Organizations and Parent Groups are included as decision-makers and resources at all stages of development • when formal parent-training is provided	• The integration of children with SEN into mainstream education through the Community Based Rehabilitation (CBR) concept faded out when the pilot projects came to an end (SpED 2005:3).[29] • The VSO programmes developed in collaboration with the SpED to supply experienced ICT volunteers to schools for the hearing impaired and other areas of disability, did not have adequate solutions for developing and replicating the programmes in other institutions around the country. • There is a lack of media attention for people with physical, sensory and learning disabilities from the state and private sector.	• Network with NGOs in order to build a **sustainable model for inclusive education** based on the IEP model for the integration of the visually impaired • Network with NGOs to increase public awareness of the rights of people with disabilities through the development of videos and materials • Allocate financial support to NGO´s and media practitioners to develop radio and television programmes which promote positive attitudes towards children and adults with disabilities. • Negotiate with the Ghana Broadcasting Corporation to sign the news and key documentary programmes as well as broadcast a weekly programme on GTV informing PWD of their rights, meetings and social events • Install a fast Internet connection to the complex where all disability groups are represented in Accra (e.g. GSPD, GNAD, GSB, etc.) • Donors need to increase their capability and capacity to be able to provide appropriate technical support to governments (in the area of IE as related to MDGs)[30][31] • The NGO community of disabled individuals needs to become more knowledgeable about the issue of education and more involved in working with governments and other organizations that focus on education.[32]

[29] The Integrated Education Project (IEP) was set up by Sight Savers, Ghana (Country Plan 2001 – 2003) in collaboration with the SpED and the Ghana Society for the Blind (GSB). The programme successfully integrated a totally blind student into a mainstream school in Hohoe District (Volta region). This programme has been successful because of the support the school, the child and her family has had through the Community Based Rehabilitation (CBR) model - funds for an itinerant teacher to visit the school, provision of free classroom materials (e.g. books in Braille) and regular eye treatment. Sight Savers is wholly committed to the integration of children with visual impairments into mainstream education and supports the SpED in the area of capacity building to enhance its ability to monitor, report and promote the integration of this disability group (Casely-Heyward and Lynch, 2003b:31)

[30] Heuman, 2002: quoted in Casely-Hayward and Lynch, October 2003:62

[31] SpEDs links with volunteer organizations should be increased with stipulations to attract more volunteers with ICT/AT skills who will work and build up capacity with staff in special and inclusive education institutions.

[32] Heuman op. cit.

Issues related to high impact levers for developing the 'inclusive model' for SEN provision	Issues arising from the current model of SEN provision in Ghana	ICT or AT Based Solutions for SEN provision in Ghana Key recommendations for funding and further development
and encompasses families of children with disabilities, and those at-risk		
Education Department A policy framework and legislative support at the national level must be in place as a necessary prerequisite to access and equal participation in IE programs. Countries that have passed legislation and adopted IE policies, with systematic monitoring, backed-up by enforcement are most positively positioned to enact IE policy. Successful countries have coupled these strategies with comprehensive education (knowledge dissemination) and awareness training directed at all levels of the system, recognizing that national policy is of little value if it isn't enacted in school and in the classrooms. IE Policy/ Legislation can have high leverage: • when national level policy frameworks and legislation support IE and inclusion of persons with disabilities in all aspects of social, cultural and economic life • when key government and education leadership decision-makers at all levels support policy and legislation • when policy and legislation is accompanied by effective and specific mechanisms for monitoring and evaluation compliance	• The survey reveals a need for government clearly to embed SEN into its educational policies. • The SpED offices which are dislocated from the Ministry compound, contribute to the marginalised status of the Division and SEN within the GES. • The Division facilities are inadequate with a lack of communication facilities, no internet access, no materials or books on special education and general poor communication channels between District Directorates and within the Division itself. • The constraints have rendered the Division unable to lead on IE policy and to advise schools on AT applications and the suitability of such products for a specific disability. • Within Ghana, official approaches to provision continue to be based on the medical model. The commissioning of more residential schools through the medical model moves away from the inclusive model of integration. A concerted effort is required from the MOESS to review this trend and look at a more inclusive, social model of education. • Radical changes are needed in the attitudes of GES towards SEN and the budgeting of the SpED's schools.	• SpED should be well resourced to carry out its planning, monitoring and evaluation activities. • SpED should to be centrally located and provided with premises that would enable it to house a learning and resources centre to cater for those working within the SEN domain.[33] • Teachers should be involved in the formulation and implementation of education policies in order to address challenges in inclusive schools properly • Inclusive programmes should be supported by the MOESS in all districts in the country. • Build up capacity in the SpED to enhance its ability to prioritize needs, draw up strategic plans, access funding from GES and donors, build partnerships, roll out implementation, monitor and evaluate so as to deliver on the gradual integration of SEN and disability groups into mainstream education.
Peters, 2004:38-46, Nine Critical Issues; Stubbs, 2002:23, Concepts about resources.	Casely-Hayward and Lynch, 2003a; Casely-Hayward and Lynch, 2003b; Interview Notes, 2007	

[33] See appendix 3

Conclusion

The MOE's policy thrust towards inclusive education is clear. Despite this there are only three districts throughout the country, which have inclusive education programmes for low vision children and these are supported mainly through the NGO community (e.g. Sight Savers International).[34] The main challenge is to develop a model of IE which can be implemented within the current context of Ghanaian education. Ghana is not alone in struggling to grapple with the implementation process. While there are some key underpinning values, beliefs and principles in IE, which are based on the social model, there is no blueprint and no accepted model on best practice. Stubbs (2002) considers that it is essential that IE is planned for and implemented in a participatory manner, firmly based in the local culture and context and fully utilizing local resources. It takes commitment, time and effort to make IE successful and sustainable.

Proposed steps and activities to develop a sustainable and viable model

It would be necessary to realize further work, analysis and discussion with the key stakeholders and like-minded agencies who were involved in the formulation of the policy framework and the Strategic Plan for SEN. The development of an IE model supported by AT as a means for achieving Education For All would require further dialogue and debate in order to clarify the values, beliefs, principles, approaches and methodologies which will underpin the model and which are derived from needs and context. [35] While many of these elements would evolve in the process of implementation, it is nevertheless essential that there exists a shared understanding particularly on the "principles which will guide and inform policy (at all system levels) and the forms of evaluation which will judge progress in relation to education achievement in any particular school".[36] The framework that would be developed could serve as a guideline for other developing partner countries.

It would be necessary to approach the Special Education Division of the GES to discuss next steps for taking the concept note forward. One proposal would be to organize a workshop to build on two previous workshops which took place during the period of the development of the Education Strategic Plan (2003 – 2015), and which were organized to develop a specific strategic plan for SEN and IE provision and to identify possible partner contributions for planning implementation.[37]

Objectives of workshop

The workshop would focus on the development of a model for Inclusive Education supported by Assistive Technologies within the overarching framework of Education For All (EFA) as defined in the ESP. The strategic objective of the workshop would be to explore what IE is, where it fits into national policy, the core values, principles and

[34] Casely-Hayward and Lynch, 2003b:13

[35] *"Is the aim (of Inclusive Education) to fit all children into the existing school system or is it to adapt systems to children; is it to empower disabled children or to improve teaching methodology?"* Khatleli et al, 1995.4; quoted in O' Toole and Mc Conkey, n.d.

[36] Ainscow in UNESCO, 2004b:37

[37] Casely-Hayward and Lynch, 2003b:4

approaches for developing a robust and implementable IE framework, and for integrating IE and AT activities into the overall national education plans. The specific workshop objectives would be to:

- Discuss the potentials of Inclusive Education and Assistive Technologies to improve the quality of education and remove barriers to learning.
- Develop/refine a strong framework clarifying the values, beliefs, principles, approaches and methodologies which will underpin the model of IE/AT for development in Ghana.
- Identify good examples of how IE and AT are working in Africa
- Share local practices where social and educational inclusion is working - CBR, SEN, Special schools, resource centres attached to mainstream schools
- Develop recommendations on how to promote and support inclusiveness with a particular emphasises on the actions and changes which are necessary to develop the inclusive school as the building block for inclusive education.

Expected outcomes of workshop

It is expected that the workshop will provide the following outcomes for the participants:

- Better understanding of Inclusive Education and the role and place of IE and AT for school development and improvement.
- A framework of values, beliefs, principles which will underpin the development of the IE model for Ghana.
- Recommendations for implementation focused on inclusive classroom and school environments supported by assistive technologies which can be sourced and/or developed locally.
- A timescale for a possible piloting of IE and AT in a selected number of districts and an outline of requirements in terms of human, material and infrastructural resources to make the pilot process work.
- Setting up of a steering or advisory group of experts local and international to meet twice a year.

References

Abbott, C. n.d. *Futurelab Series: Report 15: E-Inclusion: Learning Difficulties and Digital Technologies* [Online]. Available from: Futurelab <http://www.futurelab.org.uk/resources/publications_reports_articles/literature_reviews/Literature_Review314> [Accessed 17 July 2007]

Ainscow, M. 2004. Salamanca 10 years on: What has been the impact internationally? Keynote address. *IN: Final Report: Regional Workshop on Inclusive Education: Getting All Children into School and Helping Them Learn* [Online]. Available from: UNESCO <http://www2.unescobkk.org/elib/publications/Inclusive_Edu/> [Accessed 15 July 2007]

Ainscow, M. 2004. What are the Levers for Change to Develop Inclusive Education Systems? *IN: Final Report: Regional Workshop on Inclusive Education: Getting All Children into School and Helping Them Learn* [Online]. Available from: UNESCO <http://www2.unescobkk.org/elib/publications/Inclusive_Edu/> [Accessed 15 July 2007]

Casely-Hayford, L. and Lynch, P. 2003a. *ICT and Special Needs Education in Africa, Imfundo Report- Phase 1* [Online]. Department for International Development. Available from: <http://imfundo.digitalbrain.com/imfundo/web/papers/refpapers/?verb=view> [Accessed 16 July 2007]

Casely-Hayford, L. and Lynch, P. 2003b. *ICT Based Solutions for Special Educational Needs in Ghana, Imfundo Report - Phase 21* [Online] . Department for International Development. Available from: <http://imfundo.digitalbrain.com/imfundo/web/papers/refpapers/?verb=view> [Accessed 16 July 2007]

Khatleli, P., Mariga, L., Phachaka, L. and Stubbs, S. 1995. Schools for All: National Planning in Lesotho *IN*: O'Toole, B. and Mc Conkey, R. (eds.) *Innovations in Developing Countries for People with Disabilities* [Online]. Available from: EENET <www.eenet.org.uk/parents/book/lesotho.doc> [Accessed 27 July 2007]

Lynch, P. 2007. *External Trends Paper on Education*. Sightsavers-International (internal document)

National Council for Special Education 2006. *Implementation Report: Plan for the Phased Implementation of the EPSEN Act 2004* [Online]. NCSE. Available from: <http://www.ncse.ie/docs/ncse_imp_report.pdf> [Accessed 15 July 2007]

Perner, D. and Ahuja, A. 2004. Changing Teaching Practices: Using curriculum differentiation to respond to student's diversity. *IN: Final Report: Regional Workshop on Inclusive Education: Getting All Children into School and Helping Them Learn* [Online]. Available from: UNESCO <http://www2.unescobkk.org/elib/publications/Inclusive_Edu/> [Accessed 15 July 2007]

Peters, S. J. 2004. *Inclusive Education: An EFA Strategy for All Children* [Online]. World Bank. Available from: <http://www1.worldbank.org/education/pdf/InclusiveEdu_efa_strategy_for_children.pdf > [Accessed 14 July 2007]

Roxana, B. 2007. *How can ICT help People with Disabilities?* GeSCI (internal document)

Somuah, C. 2006. *Review of ICT Education Policy & ICT/ Education Policies for Ghana: A Report prepared for Global e-Schools and Community Initiative.* Dublin. GeSCI

Special Education Division 2005. *Special Educational Needs: Policy Framework.* Accra. MOESS

Stubbs, S. 2002. *Inclusive Education: Where there are few resources.* London. Atlas Alliance

UNESCO 1993. *Teacher Education Resource Pack, Student Materials* [Online]. : UNESCO. Available from: <http://www.eric.ed.gov/ERICDocs/data/ericdocs2sql/content_storage_01/0000019b/80/16/7e/8e.pdf> [Accessed 17 July 2007]

UNESCO 2001. *Understanding and Responding to Children's needs in Inclusive Classroms: A Guide for Teachers* [Online]. Available from: UNESCO <http://unesdoc.unesco.org/images/0012/001243/124394e.pdf> [Accessed 17 July 2007]

UNESCO 2004a. *Embracing Diversity: Toolkit for Creating Inclusive, Learner-Friendly Environments* [Online]. Available from: UNESCO <http://unesdoc.unesco.org/images/0013/001375/137522e.pdf> [Accessed 17 July 2007]

UNESCO 2004b. *Final Report: Regional Workshop on Inclusive Education: Getting All Children into School and Helping Them Learn* [Online]. Available from: UNESCO <http://www2.unescobkk.org/elib/publications/Inclusive_Edu/> [Accessed 15 July 2007]

Notes from interviews with Paul Lynch, Researcher for the Visual Impairment Centre for Teaching and Research (VICTAR) at the University of Birmingham, on Friday, July 27th, 2007 and Neil O' Sullivan, Special Education, NCTE, on Friday, August 3rd, 2007.

Annex 1: Low, Medium and High Tech Solutions for Three Identified Groups and Teacher Education

Casely-Hayward and Lynch (2003b)

Education of Visually Impaired

Level of technology	Strength(s)	Weakness(es)
Low tech e.g. Writing frames, tactile maps, musical instruments	Instruments for sound training (multi-sensory training at pre-school level) Students studying special education courses at University of Education, Winneba (UCEW) are encouraged to produce multi-sensory devices, most of which are produced from local materials e.g. texture boards, jigsaw puzzles, reading stands, educational toys and games, etc. UEW has a material library	Difficulty in obtaining moulds for locally manufactured stylus and hand frames Over-dependence on imported materials High cost of imported Braille sheets Lack of motivation for teachers to produce requisite materials Schools have low capacity to produce materials
Medium tech Braille, tape recorders, dictaphones, magnifiers	Electronic devices used from the SSS level to University level Most SSS students use Braille through to the University level Thermoform machines are used in duplicating exercises and textbooks	High purchasing and maintenance costs Use of outmoded machines

High tech Screen reader, voice synthesizers, CCTV	Existence of a Computer Learning Centre at the Ghana Society for the Blind UEW ready to set aside 4 computers with voice synthesisers for use by the visually impaired	Computer illiteracy among visually impaired Non-availability of computers. Computers not affordable

Education of the Hearing Impaired

Level of technology	Strength(s)	Weakness(es)
Low Tech e.g. cut-out pictures, alphabets of the sign language, other objects	Ordinary classroom teachers produce these easily Materials are readily available Children are familiar with materials Easily moveable	Takes long time to prepare Susceptible to breakdown overtime -- not durable No standardisations Some teachers lack sign language skills No guidelines for preparing apparatuses Teachers make little use of sign language Few interpreters
Medium Tech e.g. hearing aids (including loop system), speech trainers, computers	Standardised Reliable Children with residual hearing can access information	Expensive Frequent modification Computers received from donors are Outmoded

	Users find it more comfortable Gives users independence Easier to manipulate	High cost of maintenance Noisy environments Some batteries types are not readily available
High tech e.g. audiometers/ diagnostic impedance sound analysers, vibrators	Highly standardised Versatile Easy access to information More job opportunities Boost of confidence and morale Make communication easier	Not readily available Sometimes unreliable Requires specialists handling Antiquated notations Fast changing pace of technology High cost of maintenance Frequent hydro-electrical power outages, in the face of no alternate sources of power renders them useless

Education of the persons with general learning disabilities

Level of technology	Strength(s)	Weakness(es)
Low Tech e.g. Soft balls, drum sticks, batik making designs	There is proven evidence that intellectually challenged children can use ICT as learning tools	Existing materials are under-utilised Unfavourable public perception of children with learning disabilities

Medium Tech e.g. Sewing Machines, Ovens, Gas Stoves, Alternative and Augmentative Communication (AAC)		Poor parental support
High tech e.g. Switch operated software		ICT materials are not readily available Non availability of teacher-trainees High maintenance cost

Teacher education

Level of technology	Strength	Weakness(es)
Low Tech Chalk and black board Print materials, textbooks, rattle, styluses and frames	Capacity to produce materials locally	Little or no funding Limited market
Medium Tech Overhead projectors, public address systems, audio meter, speech trainers, sign language	Equipment is standardised	Non-availability of funds
High Tech Screen reader software, Internet	Favourable policy environment	Few people with technical know-how Expensive

Annex 2: E-Inclusion - Technology Solutions for those with Learning Difficulties

Abbott C (n.d.)

Category of technology	Strength(s)	Weakness(es)
Technology to train and rehearse Drill and practice software Integrated Learning Systems (ILS) - materials related to literacy and numeracy with diagnostic tool) - software contains many hours of activities and reporting and tracking tools to inform teachers/ Software claimed to be "teacher-proof"/ Speech Synthesis, Virtual Reality (VR) and Multi-media - Recent work with VR programmes found that students began to play more imaginatively	Claimed link between ILS software use and improved test scores/ Mechanism for raising self esteem	ILS software creates apparent sidelining of the teacher/ Diminishing effect over time/ Independent research clarified that ILC was not the panacea it was once claimed to be
Technology to assist learning Alternative and Augmentative Communication (AAC), Desk-top publishing programmes, word processors, web browsers Switches (Dasher), Widgit Literacy programmes (a suite of symbol supported programs), Clicker programs from Crick (a series of programs making use of on-screen selection grids), Standard software or hardware with extra facilities build in (alternative keyboard or mouse, a restricted set of options or a new support facility), Hand held text reading pens (facilitate easier access to web)	Use of ICT for assessment and early identification Many of the programmes originally developed for particular learning difficulties have made their way into the mainstream	Prioritization of technology (inputs) over learning (outcomes) – viewing technology as "in itself" offering the "solution" to learning difficulties
Technology to enable learning Developing tray (text rebuilding program) and Logo (innovative programming language)	Structure of technology shift from one based on categories of difference to one based around aspects of socialization and physical engagement	Need for appropriate pedagogical practice and training, in addition to resources, if technology devices are to be of real and lasting benefit

Annex 3: Starting a Resource Room to Support Learning

Casely-Hayward and Lynch (2003b)

The allocation of a resource space or room is a useful start to building awareness to staff.

HealthLink Worldwide Resource Centre manual

A resource centre can be any size, from a trunk of books or a few shelves, to a whole room or several rooms. A resource centre may be part of an organisation in its own right. It may serve staff within the same organization, people from other organisations, members of the public, or a mixture. It may be staffed by a volunteer or someone for whom it is only part of their job, or by a team of professional librarians and information scientists who are responsible for different aspects of managing the collection and providing information services. A collection of materials in a hospital or health centre meeting room, a few shelves in a room at a training institution, or a room in a community centre – all these are resource centres.
http://www.healthlink.org.uk/rcman/rchome.html

The Adult Learning and Documentation and Information Network provide a list of useful hyperlinks to pdf papers and websites on

How to set-up and run a Documentation / Resource Centre

How to develop Internet and other Information Technology Skills
http://www.unesco.org/education/aladin/resource.html

Some recommended equipment and materials for your Resource Room

- Tape recorders with in-built microphone (e.g. Grundig)
- A supply of C90 cassettes to record lessons for vision impaired students
- A laminator – to cover printed sheets and signs
- Laminating sheets – A3 and A4 sizes
- Velcro strips – hook and loop
- Coloured markers (Felt pens) to mark equipment with name of school
- Software – Widgit Boardmaker – REBUS (Black and White symbols for schedules, labelling boxes and signs for classroom)
- Binding machine Binders are available in a variety of formats including plastic comb binding, wire ring binding, plastic coil, thermal and perfect binding.

Paper cutting and trimming machines to cut posters, trim paper and make neat edges to signs.

Annex 4: How can ICT help people with disabilities?

Roxana Bassi (2007)[38]

ICTs are able to help people with diverse disabilities in several ways. Through the use of a computer with adapted input and output devices and a connection to the Internet, they are able to do things they were not able to before.

Below are some examples:

- through distance education they are able to finish school, do a training course and even obtain a University degree
- to control several parts of the house (i.e. lights, heat, doors, alarms) through control devices in their PCs
- to gain more independence being able to buy online, pay their taxes, search for information
- to be connected with family friends and colleagues through email and instant messaging in ways where they are able to communicate fully, not feeling "different"
- to be able to play games and enjoy their free time
- to connect and share with people with similar disabilities around the word using discussion forums and other online resources.

About input and output devices

Computers have what are called standard input and output devices, which are designed so that people can connect with the machine, and the machine can answer back. According to the type of disability, there are several kinds of adapted input and output devices. Most of them will need a hardware and also a software component. Once the adapted devices is in place and interacts with the corresponding software, the interaction of a disable person is practically the same as that of any other person, rendering him/her completely able to participate in cyberspace.

The following section presents some adapted input and output devices:

Standard Input or Output devices	Other non-standard devices	Destined to:	Description
Keyboard	Adapted keyboards	Blind or visually impaired users. People suffering from dyslexia. People with manual dexterity difficulties.	A keyboard of different design. Alternatives: Tactile, Braille, ergonomic, other configurations, other sensibility, other sizes.
	Speech-recognition software	Blind, or visually impaired users	Can replace keyboard input to navigate screen. Software must be accessible.

[38] roxana.bassi@gesci.org

Standard Input or Output devices	Other non-standard devices	Destined to:	Description
	Other movement input devices (called Ability Switches)	People with physical impairments.	An alternative input method that can utilize controlled movement from a foot, the head, an eye blink or a breath to select keys.
	Touch screen	People with physical impairments.	Enable a user to control a computer by pointing or touching an area of the screen.
	Keyboard emulation software (on screen)	Users with dexterity difficulties. People with learning difficulties.	The keyboard is represented on the screen for the user to select letters by using a cursor or a pointing device. The keys can also represent whole words, phrases and pictures.
Screen	Screen enlarger	Visually impaired users.	Enlarges part of the screen (through hardware or software).
	Braille display	Blind or visually impaired users.	Replaces the computer monitor and is often augmented with Speech Output Systems. A line of Braille cells gives a tactile representation of the computer's text output.
	Screen readers Screen navigator software	Blind or visually impaired users. Persons suffering from dyslexia	Turns the content of the screen into speech, that can be navigated by the user through keyboard commands
Pointing devices (ie joysticks, trackballs, keyboards, mouse)	Replaced by keyboard alternatives	People suffering from dyslexia. People with manual dexterity difficulties. Blind or visually impaired users.	Enables the keyboard arrows to be utilized as an alternative to a pointing device. This facility is standard within many operating systems and can be very useful for someone who finds it difficult or impossible, to use a mouse.
	Touch Screens	Users with dexterity difficulties.	Devices which enable a user to control a computer by pointing or touching an area of the screen. Most touch screens use a clear plastic window placed in front of a standard monitor and may be used as a keyboard alternative. They should work

Standard Input or Output devices	Other non-standard devices	Destined to:	Description
			with any mouse-driven software, but it must be remembered that mouse-driven programs are designed for small cursors rather than large fingers so, although it is a very direct method of access, some users may not be able to locate the precise, often small, areas required. Therefore, some touch screens may need to be calibrated for the individual user and/or require additional specialist software.
	Movement sensors	People with physical impairments.	An alternative input method that can utilize controlled movement from a foot, the head, an eye blink or a breath to select keys.
Printer	Braille embossers	Blind or visually impaired users.	The Braille equivalent of a printer. Produces a "print-out" in tactile Braille rather than printed characters.
Loudspeakers	Sound to text converters	Persons with hearing disabilities.	Converts recorded or live speech into text, using voice recognition software.
Scanner	Scanners with optical character recognition (OCR)	Blind or visually impaired users. Users suffering from dyslexia. Users with manual dexterity difficulties.	Character recognition software can convert scanned documents into machine-readable print, large print, Braille and synthetic speech.

Software Accessibility

In order for other “non standard” input and output devices to work correctly, computer software has to be standardized following a series to recommendations that allow it to be easily adaptable. These series of recommendations are called “accessibility” guidelines.

For web page design we suggest you visit the series of recommendations by the web consortium Web accessibility initiative, accessible at http://www.w3.org/WAI/

Other useful resources:

- "Design Guidelines for Electronic Publications, Multimedia and the Web" http://ncam.wgbh.org/publications/adm/index.html
- ISO/DIS 9241-171 "Ergonomics of human-system interaction -- Part 171: Guidance on software accessibility" http://www.iso.org/iso/iso_catalogue/catalogue_tc/catalogue_detail.htm?csnumber=39080 (several languages, commercial)
- "Web accessibility Guidelines" by the National Disability Agency, Ireland http://accessit.nda.ie/
- "Checklist for Software Applications" by Tiresias.org http://www.tiresias.org/guidelines/checklists/software_app_checklist.htm
- WAI Evaluation and Repair Tools Working Group maintains a frequently updated list of free and commercial evaluation and repair tools used to determine if a eb site follows accessibility guidelines http://www.w3.org/WAI/ER/tools/