Guidance for industry

Becta

improving learning
through technology

making accessible software
a guide for developers and providers

Recent legislation places duties on educational institutions with respect to the provision offered to learners with special educational needs and/or disabilities. In broad terms, all schools and colleges must make 'reasonable adjustments' to ensure that these learners are not put at a substantial disadvantage in using any facilities or resources – and that includes the use of ICT.

Although providers of software are not legally required to ensure that their products can be adjusted to the needs of learners with special needs or disabilities, those purchasing software – schools and colleges – are required to provide learning materials that are accessible to their disabled students. This affects the choices made by schools and colleges when selecting learning materials and, as a result, the legal obligations on educational institutions have a direct impact on the goods and services which providers offer.

This guide aims to help providers understand the legal requirements covering use of software by learners with disabilities, and to help developers and commissioners of educational software and electronic resources to create accessible, usable, adjustable and inclusive materials. It includes a list of functional requirements that are intended to help providers work in an accountable and robust way towards achieving standardisation in the accessibility of software and learning materials.

This guide applies to the software and learning materials used on individual or networked computers. It applies to tools used to access learning and learning resources, and tools used by practitioners to create resources.

Providers of software and learning content

A 'provider' is anyone who supplies software tools or content – including developers, publishers, resellers, commissioners and those who fund development work.

How do practitioners make software more accessible?

A broad spectrum of special needs and disabilities is presented by learners, and practitioners use a range of strategies and resources to support them, including ICT. Some adjustments may be relatively simple and achieved by setting up a system profile for individual learners in the accessibility options of the operating system. The profiles can include properties such as:

• menu text font (typeface, size, colour…)

• text window background colour

• mouse pointer icon size

• mouse speed and acceleration, double-click speed and click lock

• accessibility options ('sticky keys', key repeat rate, 'mouse keys'…).

For many learners, changes such as these can be the means through which they are enabled to access the curriculum. The table opposite shows some other adjustments that can be made for specific difficulties.

Why the learner requires adjustments to be made	How practitioners may adjust access for the learner
He/she has poor vision or is blind	Adding screen-reader software, speech output, tactile output or Braille print, or changing the font size and colour
He/she has very poor motor skills	Using an alternative keyboard and/or mouse, on-screen scanning systems or speech-recognition software
He/she has visual-perceptual problems	Simplifying the presentation, or adding supplementary materials
He/she has dyslexia or other reading difficulties	Using speech output or spelling checker, changing the font colour or finding an alternative such as symbols
He/she has hearing difficulties	Using technology to maximise volume, or alternative sources of information for sounds
English is not their first language	Translating or simplifying some or all of the text, or providing symbol or signing support

Setting a level of accessibility

When procuring or purchasing resources, schools, colleges and other commissioners of ICT should look to specify a minimum technical level of accessibility to be met by the ICT resources they procure (compliance with these guidelines, for example). Developers should therefore be aware that criteria for accessibility will form part of product specification for educational resources. The value of specifying a technical level of accessibility is in formalising to developers the technical features that should be included when creating a specific resource, and as a demonstration of professional best practice. Ideally, this could ensure straightforward testing of a resource's conformance to check whether it meets specified criteria.

Several standards and sets of guidelines exist which support accessible ICT development. Some standards apply more generally to accessibility and ICT while others focus on specific user interfaces.

In practice, however, there are constraints in defining ICT accessibility in purely technical terms. The *context* of use of the resource is also important in defining its accessibility. For example, an e-learning resource may be used as one component of a wider, blended learning environment, and its accessibility needs to be considered in that context. Accessibility may also be considered a *process* rather than a product – so that the *usage* of technology provides information and experiences rather than the technology itself.

Whether a particular piece of software could be said to be acceptable in terms of its adjustability thus depends on a number of factors, in particular the intended 'audience' or client group and the essential skills they need.

The educational purchasers' perspective

When educational institutions are commissioning or purchasing ICT for teaching and learning from a third-party supplier, they must set criteria for the *levels of accessibility* of those ICT resources. Whilst the desired level might be 'accessible to all users', this may not always be appropriate.

As a result, a specified level of accessibility is likely to be set, which should be attained by the ICT resources being purchased or commissioned. It will be important for the level of accessibility to be neither too low (leaving in place too many barriers for too many users) nor too high (removing from the curriculum a number of resources that would enhance the learning experience for many people, even if a specific group were unable to use it on account of a disability).

On delivery of the ICT resources, they should be evaluated against the specified level of accessibility, taking into account the context in which they are being used, and the capability expected of the teacher using them.

If an accessibility evaluation finds evidence that an ICT resource specially commissioned by an educational organisation has failed to meet the specified accessibility standard, this would be seen as a breach of contract, and the supplier would be required to take the necessary steps to remedy the situation. Similarly, if an off-the-shelf ICT resource did not meet the specified accessibility standard, it may be rejected as a potential solution.

However, setting an accessibility level should leave room for a situation where a resource may have significant value to the quality of the learning experience, but where the nature of the resource makes it impractical or impossible to meet all requirements of the specified level of accessibility.

Such a course of action may be justifiable:

- on grounds of preserving the quality of the learning experience intended to be provided or enabled by the resource
- on technical grounds, if the accessibility solution is excessively complex or impractical or impossible
- on grounds of financial outlay or time delay in completion.

In such a case, assuming these justifications have been accepted, the resource may still be suitable for use, so long as:

- the accessibility limitations of the resource are considered in its subsequent integration into a learning and teaching programme
- necessary steps are taken to provide those affected by the barriers present with an alternative means of achieving the equivalent learning experience.

In summary, not conforming to a given standard or specification does not necessarily mean that a given resource is not appropriate for use in an inclusive learning environment, as part of a blended learning solution, or in the hands of a capable teacher.

How developers can make software more accessible – the guidelines

The following guidelines have been drawn up to make software accessible to a broad spectrum of users and to extend the experience of learners. They are based on international standards and current accessibility guidelines and established best practice. Developers will note that many of the guidelines can be met by passing on the set system accessibility profile for the current user to their application.

Guideline	Essential Functionality
'Accessibility' options should be implemented including keyboard and mouse features	The system's accessibility services for keyboard or mouse control should be available. System-standard input/output streams and drivers should be utilised. If accessibility controls have been implemented in the software, these should be obvious, robust and easy to use. Audible and visible notification of the status of the accessibility features should be available. Equivalent alternatives for 'sticky keys', key delays and repeat rate control and toggling keys should be provided. Standard system mouse drivers should be implemented, but where alternative mouse drivers have not been enabled, it should be possible to re-assign pointing device button functions. 'Mouse keys' functionality should be available.
Software should be compatible with common assistive technology	User interface information should be available to assistive technology (AT). Applications should allow AT to change focus and selection and to have access to common system resources. AT should be able to access information and descriptions and be able to exercise control of the user interface. Some industry-standard development technologies do not support all of these features; developers should use tools that do.
Alternative inputs and output should be available	Enable user input/output choice and switching between alternatives, preferably without having to re-start the system or program.

Guideline	Essential Functionality
Provision should be made for alternative mouse pointing devices such as head- and eye-operated systems	Where not provided by the system or AT software, include adjustments for the delay to pointer-button-press acceptance, adjustment of multiple-click parameters, pointer speed, and pointer acceleration. Include accessible alternatives to button-hold functionality (e.g. dragging) and for complex pointing device functions such as shift+ mouse click and for simultaneous button operations. Utilities that can set the orientation of the mouse should be enabled.
Large mouse pointers should be enabled, and large targets or hotspots provided	All point and click targets should be large enough to give access to students with poor motor skills or those using alternative pointer systems (48 pixels is recommended as the minimum dimension in any given direction). Button bars should have a large format option. It should be possible to increase the mouse pointer icon to the maximum allowed by the system in all states (normal select, busy etc.). Provide a high visibility cursor or caret at the text insertion point. Enable the system (or provide another way) to aid location of the mouse pointer, particularly in complex visual environments.
Documentation should be provided that is easily understood and available in accessible electronic forms	In addition, training and support should be available for accessibility as well as the product itself.
Access interface controls and labels should be available to AT	It is important that these names are understandable, meaningful and short, to facilitate ease of use with screen-readers.

Guideline	Essential Functionality
Menus and controls should be accessible from the keyboard	Standard and long-list menu navigation should be possible from keyboard and pointer control. Provide highlights in the menus that clearly indicate the current focus. Keep all menus as short as feasible. It would be useful to be able to re-assign the accelerator and shortcut keys used so that clashes with particular assistive technology can be overcome. Provide keyboard input and control of all standard software functions using the common operating system conventions. This includes standard keyboard shortcuts to functions, menus and dialogue boxes. Avoid shortcuts that are commonly used by AT.
Application windows should be easily identifiable and simply manipulated	Use meaningful and unique window titles. Do not conflict with 'always-on-top' windows used by AT software. Any windows should be able to be re-sized and re-positioned. No windows should automatically take focus away from AT. Provide a high-visibility option to show current focus of windows and controls (for example, buttons and links). Use the standard system keyboard shortcuts for changing focus.
Supplementary materials should be provided for multimedia content	Where audio and/or video media are used which is essential to the educational objective, equivalent material should be available in alternative forms. If the original media are updated, the alternatives must be updated at the same time. (Synchronous audio description and closed captioning are only required where it is essential for the educational purpose.) Do not use pitch or the length of sounds to convey information unless this is the actual educational task; use rhythm as an alternative. Give users control of audio volume and make visual alternatives available for any audio output.

Guideline	Essential Functionality
Captions and labels should follow system settings as an option, or should have application-wide user preferences	Where labels and captions are used, enable system-wide control of captioning. It is preferable to use system settings for captioning if possible. Position any captions so they do not obscure content, and allow the customisation of text sizes, colours and typeface.
Customisation of text presentation should be possible, including typeface, font size, colour and background colour to provide high contrast	Choose colour schemes with good contrast between foreground and background. Implement the system settings for text or alternatively, provide facilities for the individualisation of colour. Do not use colour alone to convey information unless this is the actual task.
	On networked applications it would be helpful if the settings were available from any machine on the system and automatically applied when logging on. The preferences could be attached to the user profile and/or local settings.
	Users should be able to customise and make simple adjustments of their preference settings, particularly of text sizes and colours of common parts of the user interface. The settings should be stored and easily recovered for individual users. It should also be possible to customise the cursor and pointer.
Easy-to-read alternative texts should be provided	Simplified or shorter language (simple English) alternatives of texts should be provided for those with reading difficulties or for quick scanning by screen-readers. Avoid over-long Alt texts for images. Take care with the layout of information so that it is in recognisable, short 'chunks'.

Guideline	Essential Functionality
Diagrams should be clear and have good visibility	Users should be able to change the visibility of lines and other graphic items on screen. Off-screen information should be avoided. Provide a zoom tool for small diagrams or allow them to be copied to the clipboard.
Do not use flickering screens	In order to avoid triggering epileptic episodes, do not flash large areas of the screen. Epilepsy Action defines the photosensitivity range: 'Most people with photosensitive epilepsy are sensitive to flickering around 16–25Hz, although some people may be sensitive to rates as low as 3Hz and as high as 60Hz.'
Allow all text to be copied	Wherever text is used it should be possible to copy and paste where text entry is enabled and copy it in non-editable text areas. If the software does not offer a built-in spelling checker, users should be able to extract text to use it with alternative applications such as speech output, spell checkers or viewers. Text should not be presented as a pure graphic without alt text being available. Warning or error information should available as text, in a consistent user interface design. Understandable alternatives to on-screen text such as audible warnings should be provided.

Procedures and design protocols

Accessibility must be included from the first stages of the design process and built into the overall time and cost schedule. Locate relevant standards and guidelines that apply and ensure you understand what they mean for your product. Involve all the members of the development team and keep them informed of accessibility issues and what is being done to address them. Getting things right in the initial design process is more effective than attempting to rectify problems later.

Once you have chosen the target group(s) who will be enabled to access your application or resource, test both the concept and the product with them at various stages and be prepared to make changes if they are needed. Once you have the finished product, think about providing meaningful labelling and accessible documentation for resellers, purchasers and users. Clearly state the abilities that users need to access your product, the system requirements and the adjustments that can be made. This will help to ensure that customers buy the products that match their needs.

Supporting materials to help with identifying appropriate accessibility standards can be found online using the links given in the Further Information section of this guide.

How does the law affect software developments?

This section outlines the current legal situation with respect to disability and ICT in an educational context, and outlines areas of best practice that should be followed by:

• those commissioning or procuring ICT for use in teaching and learning, and

• suppliers of ICT for use in schools, colleges, universities and other educational establishments.

Educational providers have a number of obligations in relation to the accessibility of ICT equipment that they procure and use with learners. Three main pieces of legislation apply, and brief summaries of their implications are described below.

The Disability Discrimination Act (DDA)

The DDA does not itself specify what makes ICT accessible, or what standards or guidelines providers should follow, as it contains broad obligations and principles regarding disability discrimination in general. This document gives practical guidance as to the sorts of guidelines and standards to which developers should aspire to assist both the supplier and the 'Responsible Body' that they are dealing with to comply with their respective obligations under the DDA and other legislation.

Although Part III of the DDA does not apply to the design of products (only the *supply* of those products), the law is currently unclear as to whether there is an obligation to design/supply accessible software. As a licensee does not generally get ownership of software, but rather a right or licence to use it subject to certain terms and conditions, the provision of software is not generally thought to fall within the category of 'goods' but could be construed as a 'service'.

Where software is provided on media such as a CD, the sale of that media to a customer will be a supply of goods, but case law has shied away from saying whether the supply of code licensed on that media is itself a supply of goods or services. Ultimately, providers should take independent legal advice based on individual circumstances to establish the extent to which Part III imposes obligations in relation to the provision of software.

SENDA

The Special Educational Needs and Disability Act (SENDA) is Part IV of the DDA. Under this, a body responsible for a school or college (the 'Responsible Body') has the duty to 'take such steps as it is reasonable for it to have to take to ensure that disabled students are not placed at a substantial disadvantage in comparison with pupils who are not disabled'.

The concept of 'reasonable adjustment', which is not specifically defined for software and educational resources, is likely to be defined by case law over the next few years.

In practice, this 'reasonable adjustments' requirement means that the Responsible Body may look to suppliers to help overcome problems with the ICT that they have supplied. Although the provision of auxiliary aids and services to pupils with disabilities is covered by the special educational needs framework, and not SENDA, the use of those auxiliary aids and services by the school is. For instance, if despite being provided with an alternative input device, a pupil is unable to use an e-learning application provided by a supplier due to an inaccessible user interface, the Responsible Body may be in breach of its obligations under SENDA.

The 'Responsible Body'

In England and Wales, the 'responsible body' for a school will usually be the local authority or governing body for maintained schools and nursery schools, and the proprietor (as defined in the Education Act 1996) for independent schools not maintained by a local authority. In Scotland, the responsible body will be the local authority for a school managed by an education authority, the proprietor (as defined in the Education (Scotland) Act 1980) for an independent school, and the board of management for a self-governing school.

Education Act 1996 and the Education (Scotland) Act 1980/Education (Disability Strategies and Pupils' Educational Records) (Scotland) Act 2002

In addition to the obligations under Part IV of the DDA, separate obligations apply in relation to special educational needs (SEN) in schools. Under the SEN legislation, schools' Responsible Bodies have a duty to identify and meet the special needs of pupils. This includes the provision of auxiliary aids and services.

This means that a school may decide to provide additional equipment, such as a trackball for input and a screen magnifier for output, to meet a particular learner's needs.

However, in order for that learner to be able to use those devices, the software and content which he or she is accessing needs to be designed or provided in a way which is accessible with that device. Where a learner has been able to access learning materials via a school's network, for example, but a change in the school's network or operating system results in the learner being unable to do so, a school may find itself in breach of the legislation.

Disability Equality Duty (DED)

The DED came into force in December 2006. Under the DED, public authorities (which, in the case of a school or college will generally mean the Responsible Body) are obliged to take certain steps to promote disability equality, and to eliminate discrimination that is unlawful under the DDA. The new rules are accompanied by two Codes of Practice (one for public bodies in England and Wales, and one for Scottish public bodies).

Under the DED, Responsible Bodies must produce and publish a Disability Equality Scheme (DES) setting out how they will comply with their obligations, which should include proactive policies in relation to procurement and the use of ICT to allow Responsible Bodies to meet those aims.

As part of the DED guidance, the Disability Rights Commission has produced guidance on public sector procurement. This gives guidance on what obligations Responsible Bodies should place on their suppliers (those supplying learning platforms, for example). Whilst the legal obligations under the DED will remain with the Responsible Body, these should impose contractual obligations on suppliers to ensure that the goods and services that they provide are done so in accordance with the aims of that Responsible Body's Disability Equality Scheme. This should be done through the specification for the goods and services being provided and the contract terms and conditions.

This means that Responsible Bodies will now be looking to their suppliers to help develop and supply ICT goods and services which allow them to meet those aims, and suppliers who are unable to provide accessible ICT are less likely to be chosen.

Public Contracts Regulations

Suppliers should also be aware of the regulations governing procurement by Responsible Bodies. Regulations introduced in January 2006 require that '[w]hen laying down technical specifications…a contracting authority shall, wherever possible, take into account criteria for disabled persons or the suitability for design for all users.'

This means that whenever a Responsible Body issues an invitation to tender (ITT) for the procurement of any ICT goods and services, it should include appropriate technical requirements in the ITT in relation to the accessibility of the ICT being procured.

As Responsible Bodies are now obliged to include accessibility or 'design for all' requirements in their technical specifications, suppliers will now be expected to deliver proposals which meet those requirements. A failure to meet any specified criteria for accessibility may therefore lead to the award of a contract to another supplier who is able to deliver a more accessible solution.

Legal Summary

1. The primary legal responsibility for avoiding unjustified discrimination against disabled people falls on educational institutions, not ICT suppliers.

2. Educational organisations should choose an appropriate level of accessibility before work is commissioned or procured.

3. In the UK, there is no current technical definition of 'legally accessible' or 'DDA-compliant' educational ICT, and therefore educational organisations and ICT suppliers must look to published standards and guidelines on accessible software, web and e-learning design for best practice.

4. Steps should be taken to ensure that the resource meets the defined level of accessibility before delivery, for example by conducting expert reviews and/or evaluation with disabled users.

5. However, use of a specific technology with an accessibility barrier is not necessarily unlawful under the DDA, so long as:

• Existence of the barrier is justifiable on academic, technical or financial grounds; and

• The educational organisation using the ICT provides equivalent alternatives to allow affected disabled people to reach the same learning objective as provided by the inaccessible ICT.

6. Where a barrier exists and can be justified on the grounds specified in 5 above, information about the justification should be provided by the ICT producer and used by the educational organisation to inform provision of suitable alternatives.

Further information

Becta's website has further information for developers at **http://www.becta.org.uk/ industry/content/accessibility**.

There is also information and guidance for practitioners in schools [**http://becta.org.uk/ schools/inclusion**] and for post-16 institutions [**http://www. becta.org.uk/learningandskills/accessibility**].

The legal guidance in this document is adapted from 'ICT for Learning and Teaching, Disability and Legislation: Guidance for Commissioners and Suppliers' [**http://www. becta.org.uk/industry/content/ accessibility**].