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Teaching Internet skills to pupils with a severe visual impairment

by Rob Jones

In Scotland, national guidelines were laid down for the content of, and the targets to be attained in, Information and Communication Technology, for all 5–14-year-old pupils. This article gives an account of the planning, design, implementation and evaluation within a specialist school for blind and partially-sighted pupils of a teaching programme to enable them to access and use the web as part of this curriculum. An analysis was made of the specific core skills required by visually impaired students for the Searching and Researching Strand of the Guidelines. The problems encountered by the teacher-designer and pupils with different degrees of residual vision are described, and an assessment is offered of the impact and success of the teaching programme. The importance is stressed of web-site designers to be sensitive to the needs of visually-impaired users when preparing their information sites.

Introduction

In 2000, the Scottish Executive introduced National Guidelines in Information and Communication Technology (ICT) for 5–14-year-olds, reflecting the importance of ICT as a tool for learning and teaching in schools. For teachers of pupils with severe visual impairments seeking to implement teaching programmes to meet the targets outlined in the Guidelines, two key questions come to mind. First, are the targets technically achievable given the current state of development of access technologies? Second, if the targets are technically possible, are they realistic for pupils yet to develop an expert level of competence in the use of access technologies? Only if the Guidelines are both technically feasible and realistic for the classroom are they appropriate for shaping teaching programmes.

The answers to these questions, with specific reference to the Searching and Researching Strand

of the Guidelines, were to be found through development and implementation of a teaching programme at the Royal Blind School which aimed to ensure that the pupils had the skills required to make effective use of the web across the curriculum. This programme arose as the result of the modernization and upgrading of computing facilities at the school, which included the introduction of high speed Internet connections in classrooms together with the appropriate access systems.

The 5–14 National ICT Guidelines

The Searching and Researching Strand of the Guidelines is composed of the following areas:

- 1) where to search
- 2) how to search
- 3) how to extract information
- 4) how to evaluate the results.

Concentrating on the practical skills outlined in areas 1–3, the targets specific to using the Internet outlined in the Strand are summarized in Table 1.

Breakdown of the Searching and Researching Strand

Pupils with a visual impairment need to master a set of skills in order to achieve each of the above targets. Table 2 provides an illustration of the skills that would be needed to meet the target of entering a specific URL to access a particular website.

Illustration of a Target Core Skill

Each target was checked using the chosen access technology (JAWS) to ensure that it was technically possible. During this phase, it was found that the targets could indeed be completed using access technology, though some tasks were significantly more difficult than others. Following the technological testing of the Guidelines, the planning and implementation of a teaching programme could begin.

Where to search	Use timetable on the Internet – rail, bus, air travel. Make use of specialist search engines e.g. in different subject areas. Use online language translators.
How to search, for example	Look at websites with teacher help. Use in-built email to make contact and ask for information. Use bookmarks to access websites and use simple keyword searches in these. Use links supplied within a website to search for information in related sites. Enter a specific URL to access a particular website. Use the toolbar or menu to navigate within a website. Use a search engine to identify websites containing specific information. Use bookmarks to store addresses of useful sites. Refine searches by adding additional search strings and by logical operators.
How to extract information	Print information found. Save text and graphics captured from web pages and assemble them into simple word-processed documents. Downloading files; understanding of file types and sizes. File transfer and file compression.

Table 1: Breakdown of the searching and researching strand

Target	Core skills
Input URL address to access a specific website	<ul style="list-style-type: none"> ● Load access technology ● Load web browser ● Activate Open dialogue box from File menu or use ALT + D to move to Address Box ● Enter URL ● Recognize that web page is fully loaded and can be read

Table 2: Illustration of a target core skill

Preliminary activities

Prior to the upgrading and modernization of ICT facilities at the school, there had been few opportunities for the pupils to make substantial use of the Internet at the school. So, before meaningful teaching and learning activities commenced, it was decided to establish exactly how much knowledge the pupils had gained about the web, prior to formal teaching input. The pupils were invited to write down their thoughts on what exactly they thought they could achieve using the Internet and World Wide Web. This provided the opportunity to explore the concepts surrounding the Internet and establish what exactly the pupils thought they would find.

The most limited answers came from those who had no experience of the web. These pupils, however, all correctly stated that through the Internet you could search for information as well as communicate via email, though they were unable to elaborate further. They also identified leisure activities, including playing games and online chat. However, despite their limited answers, the perceptions of these pupils who were functionally blind were correct when it came to what could be achieved on the net. There were no spectacularly incorrect assumptions from any of the pupils.

Those who had experience of the net provided more complete explanations on many of the topics. They explained that searching took place using search engines such as Google, Yahoo and Ask Jeeves and outlined that it was possible to find information on news sites such as the BBC. As one pupil succinctly stated: 'Missed the 6 o'clock news. The web will catch all the news from around the world'. Pupils also explained that it was possible to shop on the Internet for food, clothing and holidays as well as participating in online chatting.

Perhaps the one 13-year-old blind pupil who has extensive experience of using the Internet at home provided the most interesting explanation of what could be achieved on the web. On search engines: 'There is a searching tool called Google, so say you wanted to search for information on TV programmes, Google will look for what you want, all you have to do is just type in what you are looking for and Google will do the rest'. Communication: 'You can send messages to other computers. The name for the messages you can send is called email. You have to have an email address before you can send messages to other people. Another way of communicating is joining a chat room. Lots of people can be on and that's why you don't give out personal information because you can get weirdos on the net, like bad guys who pretend to be someone else'. Finally, shopping on the Internet: 'You can order things online, instead of going to the supermarket'.

It is clear that without any formal instruction, but with experience, pupils with a severe visual impairment are able to acquire a good understanding of all the opportunities provided by the Internet, from searching for information, alternative methods of communicating and consumer activities. It was also reassuring to see that some pupils had acquired an understanding of the importance of keeping safe. This all boded well for the formal teaching process which would follow.

Planning the teaching programme

In planning the content of the lessons, two key decisions had to be made. The first related to whether the order of the attainment targets outlined in the 5–14 Guidelines (Level A tasks, followed by Level B and so on) were relevant to pupils with a visual impairment, or would an alternative sequence suit the pupils better. The progression detailed in the targets was, however, found to be suitable for the teaching of pupils with a visual impairment, as they require specific skills to be mastered before independent searching can take place.

The second decision related to deciding which websites would be included in the teaching programme. All sites that the pupils would have to visit at the beginning of the programme would have to be 'visual impairment friendly' in terms of their accessibility. This, it was hoped, would build confidence and prevent the possibility of disappointment arising due to inaccessibility. Only after pupils had acquired the core skills on websites selected in advance for their suitability would they be introduced to the use of search engines where inaccessibility becomes an issue.

However, accessibility was not the only key issue which had to be addressed when deciding on which websites would be included in the project. Teachers preparing to include web work in their lesson plans will search for sites which provide content or experiences to meet a specific curriculum goal with the pupils acquiring web skills incidentally. The purpose of this project was to deliver skills-based training which pupils could take away and use in other areas of the curriculum. Nevertheless, the websites selected had to be educationally sound.

Haugland and Gerzog (1998) have provided a useful tool for selecting appropriate sites for pupils. Websites are evaluated for their appropriateness and educational value using the following criteria:

- age appropriateness
- whether the child is in control of the experience or the computer
- clarity of operating instructions
- expanding complexity and challenge – easy to enter but with a high ceiling
- independence – encourage minimal teacher input
- process orientation – inherently motivating the pupil to learn
- real world model – reflecting the richness and reality of the world
- non-violent

- technical features focus on the learning objectives
- ability to change web objects and situations to learn about processes.

A number of Haugland and Gerzog's criteria are particularly relevant for teachers evaluating websites for use with pupils with a visual impairment. The importance of the child being in control, clear instructions and independence all underlie the principle of accessibility. The search for appropriate and accessible web content led to BBC Scotland's Education site. Not only are these sites accessible, but the content has also been developed with specific reference to 5–14 Guidelines across many subjects and the sites score well on Haugland and Gerzog's scale. The BBC's web content was to provide a useful starting point for the teaching programme, but many other sites would also be included as skills developed.

Findings from teaching and learning activities

A total of 23 pupils participated in the teaching programme, nine of whom were blind. The teaching was delivered in the small class sizes that are possible with a special school environment. Pupils were taught web skills with a maximum ratio of four pupils to one teacher and more often on a two-to-one ratio. This proved to be very beneficial since a simple typing error such as a misplaced full stop can be very important when using a web browser. For pupils placed in mainstream schools with much larger class sizes, it will be necessary in the early stages to ensure that the pupil with a visual impairment is extremely well supported in the class so as to ensure that he/she does not fall behind the rest of the class through inaccurate text entry.

The pupils remained highly motivated throughout the teaching phase of this project, with many pupils soon making use of their new skills outside of the classroom. However, unlike partially-sighted and fully-sighted pupils who are able to practise their skills after classes, pupils who are functionally blind had fewer opportunities to do the same due to lack of access to appropriate software and/or support outside of school. Therefore, between lessons these pupils had little chance to revise or experiment on their own. This impacted on the pace of learning and it was necessary to constantly revise and reinforce previous learning.

Although the pupils did not have the opportunity to access the web outside class, they remained very

aware of it in the times between lessons and often came to class with requests to access websites that they had heard advertised, either on the radio or at the end of television programmes. It was possible to keep the pupils very well motivated during class time by allowing 5 minutes at the end of a lesson trying to visit one of their own suggestions. Very often the sites that the pupils wanted to visit were full of audio content which required the use of a media player such as Real Audio Player. With a little support, pupils were rewarded with the opportunity to download and listen to audio material which they would not have had the opportunity to listen to without this research taking place. There arose a great deal of delight and satisfaction when this was successful and pupils' self-confidence and motivation was heightened.

The pupils' suggestions showed that they wanted to avoid sites focusing on visual impairment, even though these websites were very accessible as they complied fully with the accessibility guidelines laid down by the World Wide Web Consortium. Sites that were of interest to some of the pupils certainly did not meet any of the criteria specified by the guidelines (e.g. Smash Hits).

It also quickly became clear that teaching in small groups was essential even when headphones are used to listen to the screen reader. The pupil has to listen to a lot of information being spoken by the synthetic voice, which takes a great deal of concentration. He/she also has to be aware of when the teacher is giving instructions and mute the screen reader appropriately. With small groups of two pupils this was not such a great problem. However, with groups of three or four, ensuring the whole class was at the same point and following the correct instruction became a little more difficult.

Analysis of impact of teaching activities

It is pleasing to note from an assessment following the teaching input that all the pupils managed to improve the level at which they are functioning, with some pupils making significant improvements. Through the careful selection of websites, e.g. BBCi and Enchantedlearning.com, all pupils have been able to master the Level A and B skills of:

- loading a web browser
- accessing a website using the favourites list
- performing a key word search
- using links within a website to locate information.

Within this group of tasks, pupils have been taught

how to read web pages using continuous read and word-by-word reading. All pupils have also been introduced to loading a website independently by entering its address (or URL) as well as using toolbar equivalent functions such as forward, backward and print. A couple of pupils were, however, still unable to use the history list independently. A number of pupils are also still mastering the skill of copy and pasting text from web pages to Word.

Some tasks proved to be very challenging, particularly using online timetables. To master this pupils are required to be able to input information through forms, including all the different structures available – edit boxes, pull down lists, radio buttons, check boxes etc. Once this had been mastered, they also had to be able to navigate the tables which provide the results of the enquiry. Only by searching across a number of providers did it prove possible to find websites that were accessible enough to achieve this target. Even with the careful selection of online timetable websites, this remains a skill for all but two of the pupils to master.

Turning to the specific question of whether or not tasks linked to the targets are achievable with the current access technology, it is clear that the Guidelines are achievable using the current technology, but with some important qualifications. The Guidelines state that pupils should be able to copy and paste graphics and text from a web page into a Word file. For pupils who are blind, it proved possible only to copy and paste text, not graphics. However, given that the text content is the most important for these pupils, it was felt that demonstrating successfully the skill to copy and paste text between applications had achieved the target.

Concluding remarks

Importantly, the attainment targets for the use of the Internet as specified in the Searching and Researching Strand of the Scottish 5–14 National Guidelines for ICT are definitely technically and realistically achievable by those with little or no vision. This is a very positive outcome for those responsible for producing the Guidelines, given the rights that a student with a disability has under the Education (Disabilities Strategies and Pupils' Educational Records) (Scotland) Act (2002). Without a doubt the web is likely to remain a very challenging environment but, hopefully, just as the graphic user interface operating systems became fully accessible, so will the web. As with many areas of life, success is also very dependent upon the level of interest and

determination of the individual. A lack of access to alternative forms of information is also a key factor. Where easier options are available, for example, television, radio, tapes and braille, the Internet may hold little interest. When this is the case, the level of achievement in searching and researching using the web will be lower than cases where there is a very real desire to work to overcome the challenges of hard to access websites.

The difficulties experienced in finding accessible websites that provide information about travel by air, coach and train highlighted by this research is a particular concern, particularly for a group so dependent on public transport. Despite the Disability Discrimination Act and other initiatives undertaken by groups such as the World Wide Web Consortium and the RNIB, major companies including some national airlines currently fail to provide web content which is accessible. More pressure needs to be exerted on such organizations so that they are aware of the needs of the visually impaired. That said, there are encouraging signs that major private corporations are, at last, starting to take account of the needs of visually-impaired people. Manchester United Football Club was recently awarded a Visionary Design Award 2003 for their website which complies with the

Disability Discrimination Act. Hopefully, other organizations, particularly those providing online travel information, will follow and undertake similar initiatives.

References

5–14 National Guidelines in ICT available for download from: <http://www.ltscotland.org.uk/5to14/guidelines/ict/index.asp>

Haugland and Gerzog Developmental Scale available at: <http://www.childrenandcomputers.com/evaluations/websites/webscale.htm> and http://www.childrenandcomputers.com/Articles/selecting_developmentally_approp.htm

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