

Electronic Orthodontics

ROSS HOBSON

Child Dental Health, Newcastle Dental School, Newcastle upon Tyne, U.K.

Introduction

The use of computers and electronic communication is rapidly expanding, with websites being advertised (and being used to advertise) in the media and also being routinely displayed on TV. This form of communication is rapidly becoming the 'norm', as evidenced by the fact that, in the U.S.A., some 40 per cent of the population regularly use electronic mail.

In this article, I wish to describe some background to the electronic communication phenomena, how it affects us as orthodontists, and how the British Orthodontic Society is addressing these issues within the BOS website.

Background

The internet is a massive interconnection of computers across the world, which was originally designed to link academic and government computers. These links can be used for electronic communications via the written (typed) word, voice, and video, between computers anywhere in the world at very low cost. It is even possible to remotely control software and hardware.

In some industries this has initiated new working practices. For example, within the field of architecture, a number of companies have offices situated in locations around the world. As well as having a 'local' presence, active internet connections mean that a project can be worked on in one office and then at the end of their 'day' it may be passed electronically to the next office around the world, which is just starting the day's work, and so on, until it arrives back at the original office at the beginning of the following local working day. Thus, an international team can work 24 hours a day on a project, both reducing costs and shortening deadlines.

Other companies use the internet for 'on-line' discussion of designs, where a project design can be seen by a number of individuals from different international locations they can then interact and change the design simultaneously.

In medicine, remote diagnosis has become a reality. This 'Telemedicine' has helped shorten waiting lists and can be used to remotely direct operative procedures. For example, Pete Goss severely injured his left elbow, whilst yacht racing solo around the world (having completed that amazing rescue off Southern Australia of Therry Dubois), it was apparent that it required immediate treatment. Specialists in London were able to instruct him, via a satellite-computer link, on how to successfully perform the procedure on himself.

In orthodontics, Bristol and Cardiff Dental Schools

have been pioneering the use of computer links for remote diagnosis using video links between dental practices and the hospital-based consultant. This has the potential to reduce inappropriate referrals, inconvenience, and costs to patients. In medicine, computer conferencing has been used to provide lectures by experts in their field to a number of universities across the U.K. The students can interact with the lecturer, as he/she has a video link to all the centres, so widening the basis for discussion. In Newcastle and Dublin Dental Schools, all clinics have computers with full internet access for both students and staff. They are used as a teaching resource (e.g. Computer Assisted Learning) and as an information resource (e.g. Medline). The student can look up a problem on Medline or alternatively search the vastness of the world wide web on any problem likely to arise clinically. So, like it or not, computers increasingly are entering our daily practice.

The world wide web (www) is a part of the internet, it is the world's largest store of accessible information, and is composed of millions of inter-linked 'pages' or documents. These pages can contain text, pictures, sound, video—almost anything!

A site is a collection of pages that have been produced together. The information for these pages are contained upon a computer, known as the server. As the links between pages are 'invisible', information is easily linked between servers across the world and it is not necessary to know which computer actually holds the information.

The www is different from a book, since pages can be joined by 'hyperlinks' (a text or graphic which leaps to another web page). This makes it possible to seamlessly join documents and also make it much easier to find information. In addition, it is possible to interact with webpages; examples might be virtual shopping at Tesco's or, alternatively, searching for information on a product. These searches are undertaken by 'search engines', which enable you to find a keyword, not only on a particular site, but across the whole www. It is also possible to publish your own web site, the information instantly becoming available to anyone via the internet.

It is the ease of availability that makes the www appealing to people as a rapid means of finding information on diverse subjects. However, there is no control on either content or the quality of information available. It is not like a journal where an editor has overall control and papers have to undergo strict peer reviewing. This lack of control can lead to misinformation.

This was illustrated recently by Steve Ainsworth in a recent issue of *The Dentist* (January, 1999), he commended the highly visual site, www.mercuryfree.co.uk, but commented that the quality of information was dubious. On the other hand, the British Dental Association website, www.bda.org.uk, as you might expect, has both a good presentation and scientifically validated material on their

Correspondence: R. S. Hobson, Child Dental Health, Newcastle Dental School, Framlington Place, Newcastle upon Tyne NE2 4BW, U.K.

site. There is information for the public, dental profession, and press (all the BDA press releases are given).

To try and improve the information to dentists the International Association for Dental Research (supported by Unilever) has founded its own website (www.dental.faculty.org) for accurate and informed discussion of dental research. However, to gain full access you need to be a member of IADR. OMNI (Organising Medical Networked Information) is the U.K.'s gateway to high quality biomedical Internet resources and acts as a filter for quality web resources that are relevant to U.K. practitioners.

Commerce and the government has not been slow to realise that the www is a means of providing the public with information on products and services. It was with all of these factors in mind that discussions within the BOS began a few years ago with the aim of establishing a British Orthodontic Society website.

BOSweb—www.bos.org.uk

The British Orthodontic Society Website, abbreviated to BOSweb, was established in September 1998 following a number of trials by various groups of the society. The BOS council quickly realised the potential for getting the correct information across to the public, not only to increase their awareness of orthodontics in general, but also to act as a 'beacon for what is good' about U.K. orthodontics, whilst providing quality information in an accessible manner.

I was asked to undertake the role of 'editor' for the BOSweb, and launched into discussions with Netsite Productions Ltd and other interested parties within BOS in order to agree the design and layout. This is an extremely important part of any website construction, since the pages have to be easy to read and use, with good clear links between different pages, so that navigation through the site is unambiguous. It must also be easy to modify and update. A successful website must be stimulating to the user and we hope that this has been achieved. Certainly, thus far, comment from within the U.K. and abroad has been positive.

All this took a number of months and meetings—this is where the internet came into its own and helped keep travel costs down. I have never visited Netsite Productions and have only met their representatives once! All discussions took place via electronic mail—no phone or fax bills. The process was two-way: Netsite has skills in design and layout (their clients include Nintendo and Kellogs), and understandably, to start, had little knowledge of orthodontics. By the construction of 'dummy' websites I was able to examine and discuss on-line different layouts and styles for the webpages, eventually agreeing on the current version.

BOSweb site went 'on-line' at the end of June 1998 and since then there have been over 90,000 'hits' to January 1999, of people who have read the pages. How do we know this? All computers that contact the site leave an identity, and appropriate software is used to record the type of computer (Apple/Mac, PC, etc.), the type of browsers used (Explorer, Netscape, etc.), the length of time spent on the site, and what pages were read. I have access to Netsite Production's own report pages (via the www) activity about the site.

OK, so what's in the pages and how do I access them?

This is a frequently asked question and, as Paul Downes (1999) has just completed an excellent series of articles

(also available as a booklet) in the *British Dental Journal*, a full and detailed description is inappropriate here.

So here goes, a 'rough guide' to www using BOSweb as the example.

Access to the www

First, you require a computer, appropriate software, and a link to the internet. Most computers sold now have either a modem (a 'box' that allows you to connect to other computers via the phone line) included or cheaply available as an optional extra. The modem connects via the telephone to your ISP's (Internet Service Provider) computer and, hence, to the internet as a whole. ISP's are companies such as Compuserve, AOL (America On Line), Demon Internet, BT internet, etc. They provide a dial-up phone number, software, and varying levels of support to connect you to the internet. Costs vary from free (see Dixons/Tesco's/Curry's/PC World/The Link and ask for a copy of their Freeserve Internet CD; see <http://www.freeserve.net> for more information) to a charge of a few pounds sterling a month (AOL, Compuserve). Be careful, some of the free providers charge for access to their help lines. The ISP provides you with an e-mail address (for example, your.name@provider.com) and a certain amount of file space on their computer server. This file space can be used for data storage or, more usually, as a site for you to create your own webpages.

In the U.S.A. local phone calls are free, hence the high use, while in the U.K. the cost of local calls are reducing and use of discount schemes (e.g. British Telecom's Family and Friends) can help further. Think of it, a letter or document sent anywhere in the world for the cost of a local phone call!

The great thing about the web is that it is 'cross-platform'. This means that you can read web pages using any computer (PC compatible, Apple Mackintosh, Unix, etc.), and you will all see the same information. This is because all webpages are written using an HTML format (Hyper Text Markup Language), which is derived from the markup languages used in the printing industry.

To be able to read www pages you require a program that will allow you to view the web pages. This is known as a browser, it will read the HTML file and tells your computer how to display the pages. The most common browsers are Microsoft Internet Explorer (MSIE) and Netscape Navigator (NN). They both allow you to read the web. Most ISP's provide you with one of these programs as part of their start up package or they are freely available by downloading them from the internet. Be careful if you are using MSIE4, as when it is first loaded you are given the option of integrating it fully into Win 95. This can make changes to the operating system that takes it very close to Windows 98 and this may not be what you want!

Having gained internet access and connected to the www using your browser, the next stage is to input an address to find a particular web page. Web addresses are called URL's (Uniform Resource Location), it is the internet's unique address of a particular page on the www. URL's are everywhere (e.g. adverts on TV), and they all have the same features (e.g. <http://www.bos.org.uk>).

The 'http://' stands for hypertext transfer protocol, which

can be thought of as the language by which the computers communicate. Often URL's are abbreviated to www.bos.org.uk—the browser 'recognises' that the 'http://' part should be added and automatically places it into the URL for you. This takes you automatically to the starting or 'home' page of the website (Fig. 1). From there you can explore the other pages on the website by clicking on the text/graphic. If you click on the text 'conferences' the URL will change to www.bos.org.uk/conferences/. This indicates that the page you are reading is in a directory or file within the website. This tells the browser the exact location of the BOS web site page on conferences (Fig. 2).

On this you will see a number of features. Some are relevant to the browser, in this case Netscape Navigator (Fig. 2) or MSIE4 (Fig. 3). Let us look at how the browsers work.

Most of the buttons are common to NN and MSIE.

There are **back** and **forward** buttons on the tool bar. These take you back to the previous pages loaded, or forward to retrace your steps. A **reload** button reloads the page currently viewed. The **stop** button interrupts the downloading of a page. To return to your browser's home page click on the '**home**' button. The **search** button downloads Netscape's or Microsoft Network's search engine for searching the www.

The **address** or netsite window shows the URL of the currently displayed web page. You can highlight this window and type in a URL (www.bos.org.uk/conferences) to jump directly to that webpage. Using either **bookmarks** (NN) or **favourites** (MSIE), you can save these so you can recall the URL's of webpages that you wish to revisit later.

On the web page itself there are a number of features that help guide and navigate you through the site. At the top is the banner which informs you that you are reading the BOS webpages. There is then a blue banner showing you other pages of information pertinent to the whole of the web site (i.e. conference), which is underlined to indicate which pages you are currently reading. If the mouse is passed over these titles, boxes appear giving some more explanation of what to expect on these pages. This is an example of interactive graphics, whereby clicking the mouse when the pointer is over the graphic will cause something to happen—usually a 'jump' to another page.

The next banner indicates which pages within those on the conference are available (they are also replicated in bold text along side the descriptive text) and the underlined page again indicates where you are.

Looking again at the main banner, you will see the **members** page. This takes you to that part of the website that is restricted to members of the BOS. You will be asked to identify yourself by typing in a user name and password (Fig. 4). At the time of writing these were user name: bos, password: tooth (by the time you read this these will have changed and you will have been notified of the changes via the post). Notice that you *must* type the user name and password *exactly* as you receive it—it is case sensitive. Initially, it was planned to have individual user identities and passwords, using your surname and BOS membership number. Whilst this is technically possible, the cost of regularly updating a database far outweighed any advantages. Remember that nothing is absolutely secure on the internet

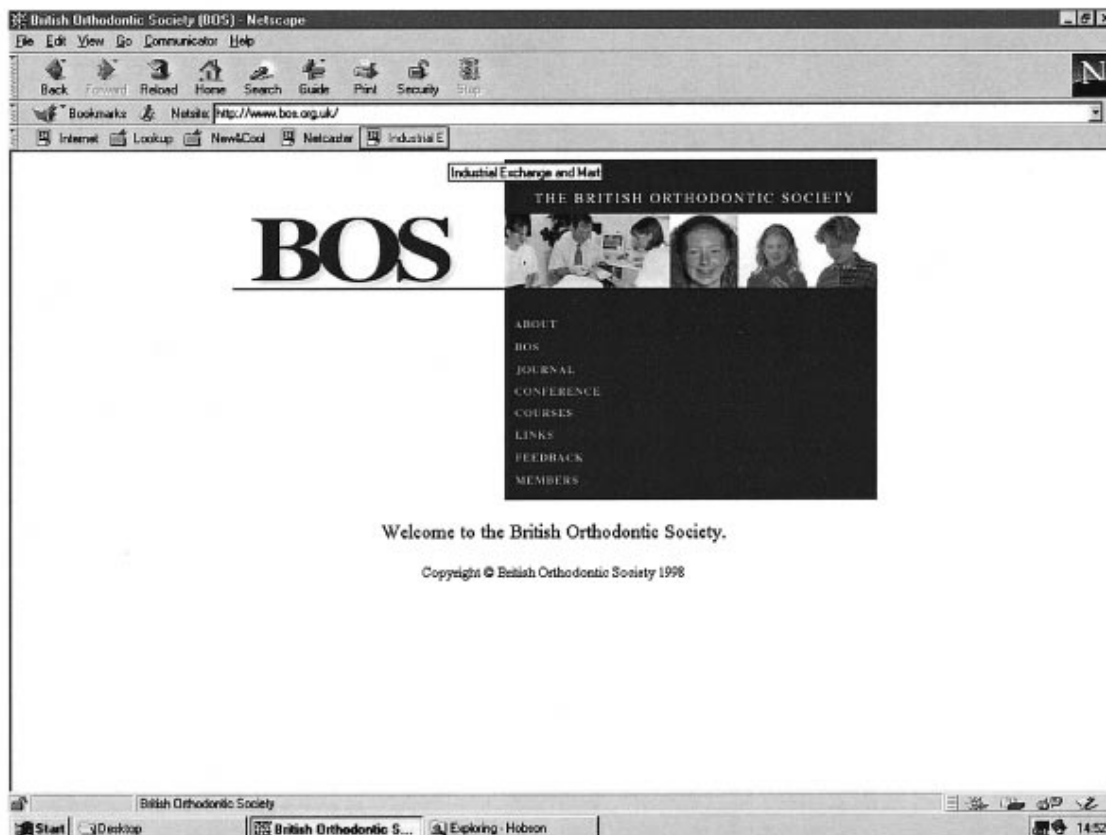


FIG. 1.

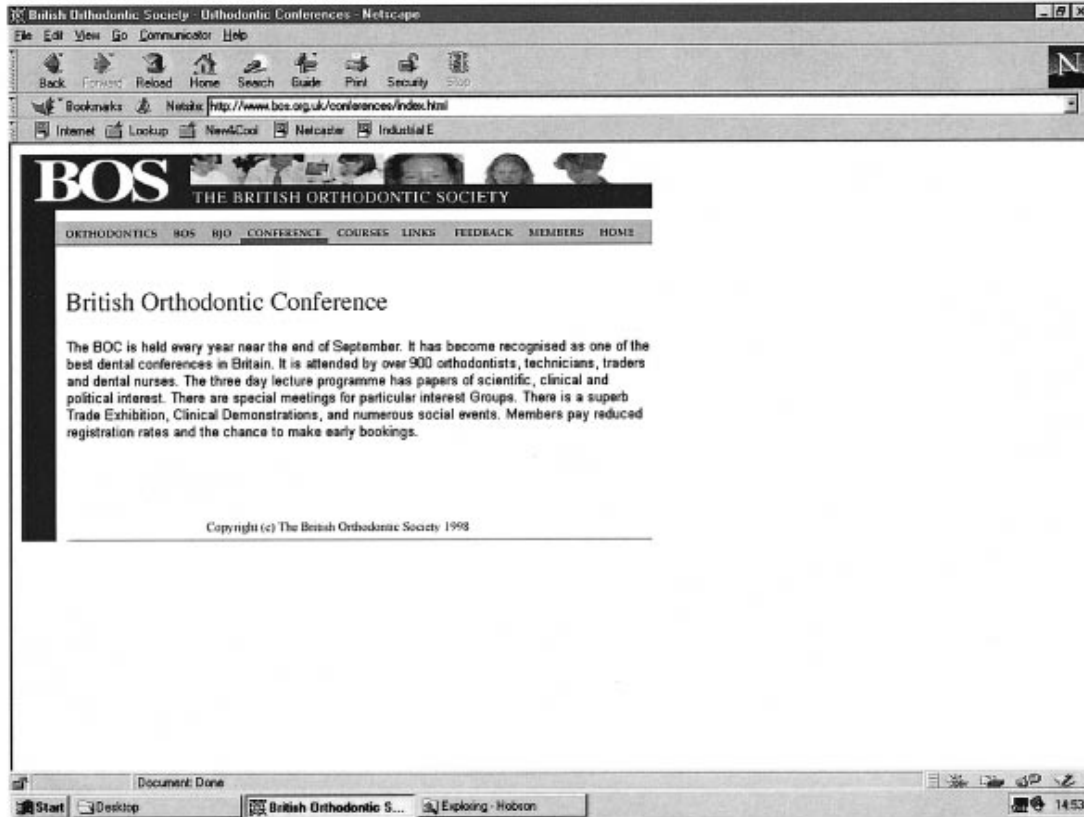


FIG. 2.

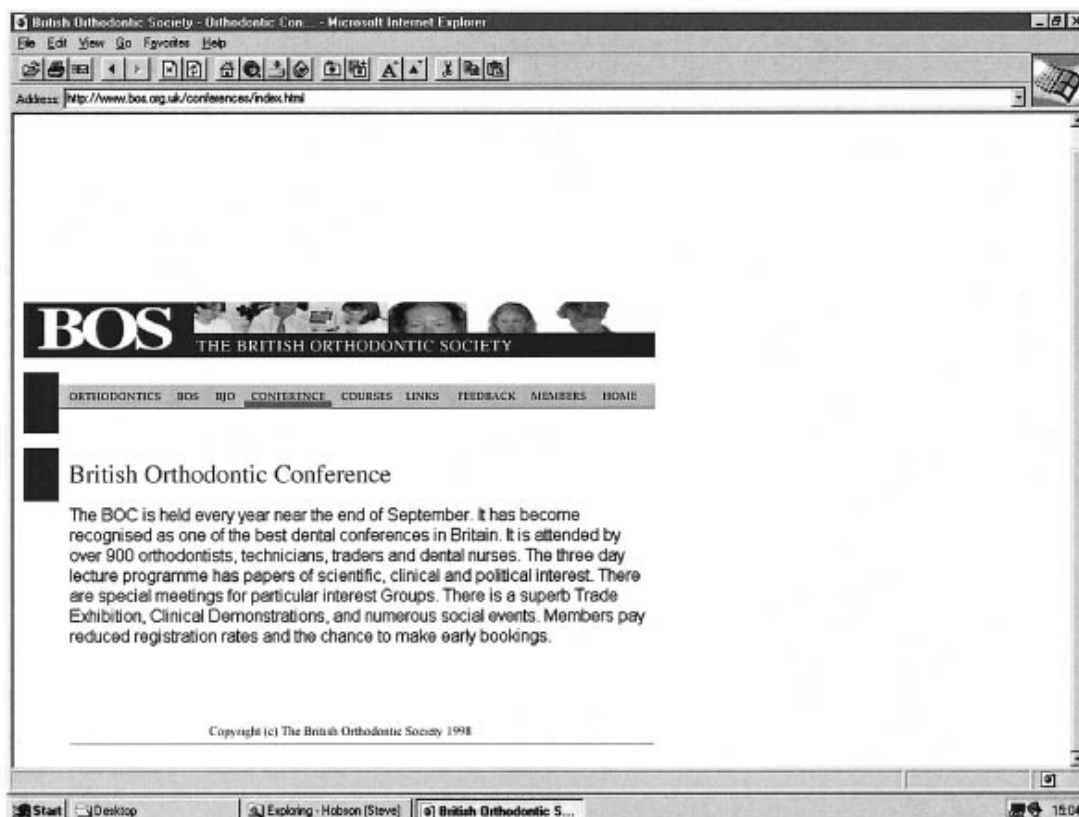


FIG. 3.

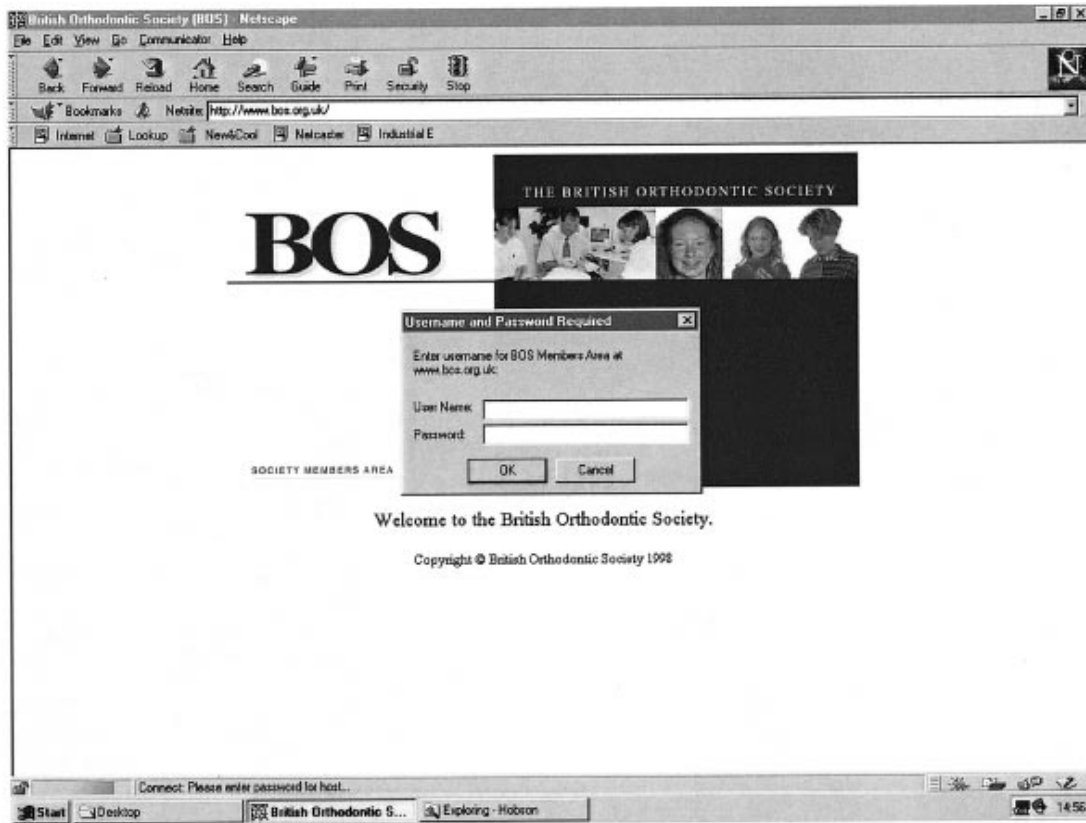


FIG. 4.

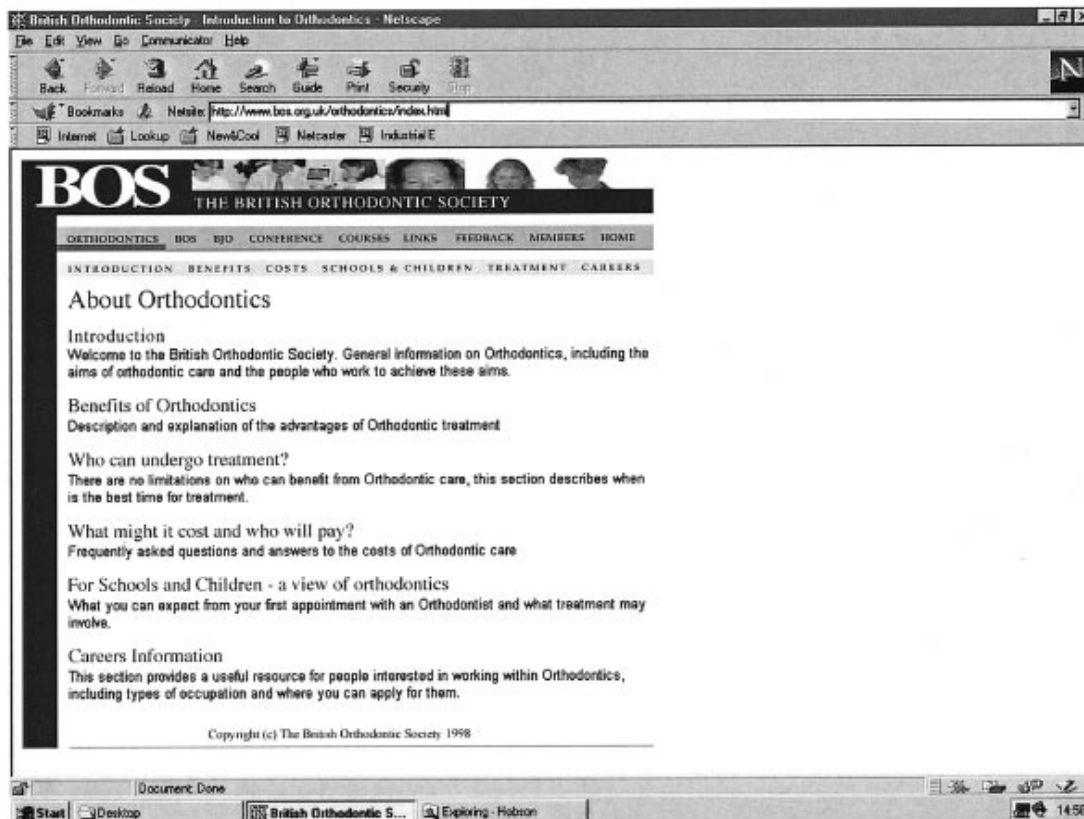


FIG. 5.

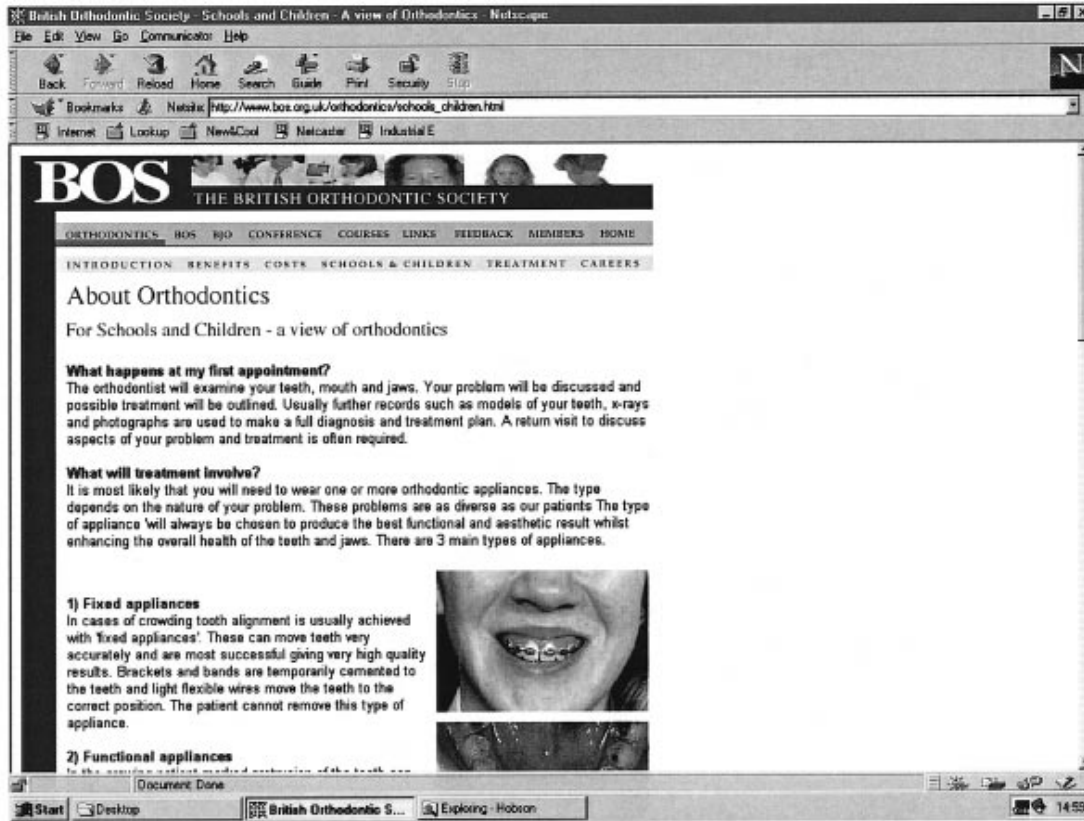


FIG. 6.

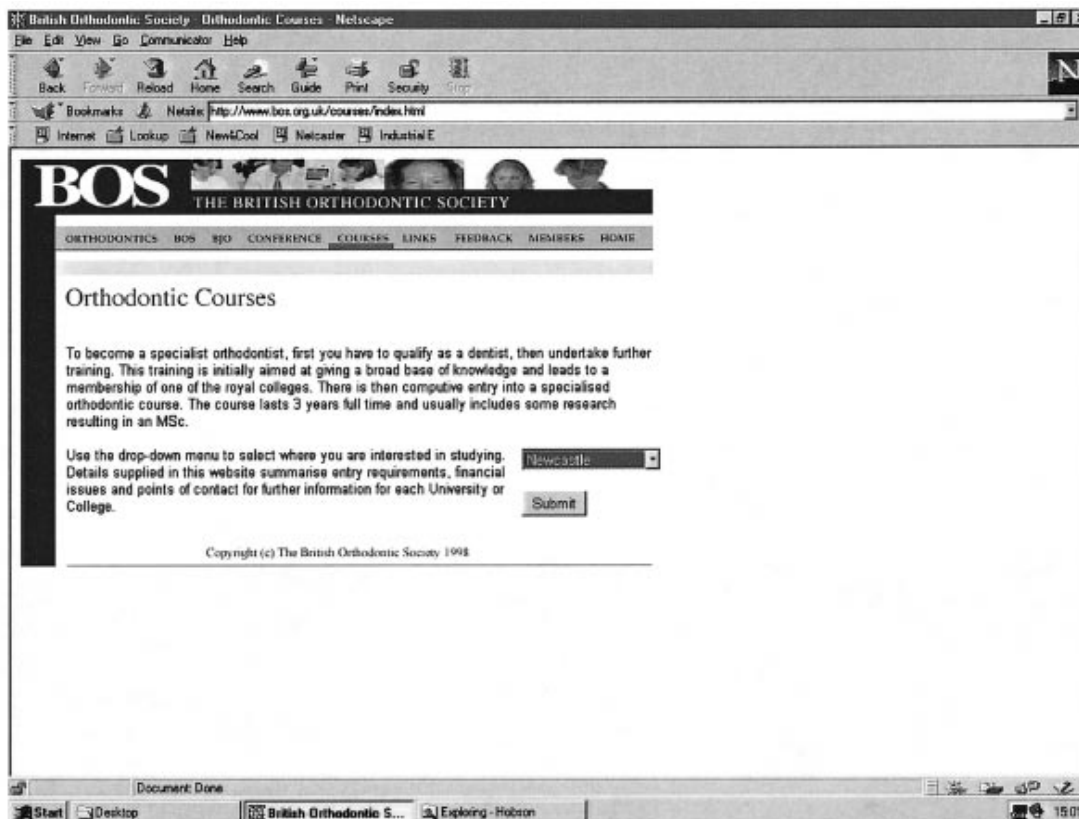


FIG. 7.

and a determined hacker can break most protection mechanisms: even the Pentagon has been successfully hacked into. Therefore, it was felt reasonable to use generic user names and passwords, changing them at regular intervals.

Since one of the aims for the BOS website is to facilitate the referral of patients between members of the society, it is planned to have a searchable database of members (giving only their preferred work address), within the restricted (members only) part of the website to facilitate finding fellow orthodontists in other areas of the country. If you wish to be included in this database please write to the BOS office indicating that you wish to be included in the web database and your preferred contact details. Your permission is a legal requirement under the data protection act.

Other areas of the members pages gives details of each of the special interest groups, contact details of their committees and any information that the group wishes to distribute via the website to their members.

One of the main functions of the website is to realise public awareness of U.K. orthodontics and this is reflected in the 'public areas'. There are pages on orthodontic treatment, the benefits, how to be referred for an opinion, the costs, etc. (Fig. 5). These pages have excellent textual content, but we desperately require good images to display the best of U.K. orthodontics. If anyone has images of good cases before and after (during treatment as well if possible), please can we use them on the web. Remember, if a patient is identifiable from the image, written consent for its use must be obtained. What we wish is to show the benefits of undergoing various forms of treatment, removable, fixed, headgear, functional, surgery, etc., with explanatory text to explain to the lay person what it involves.

Another area of the site is targeted at schools and children (Fig. 6). Since schools are increasingly making use of the internet as an educational resource, it is envisaged that an area for both teachers and pupils explaining orthodontics will need to be developed. Obviously, any suggested class projects should have an educational purpose and be achievable by the target age group. Again, a plea here for an orthodontist with an interest in this area to get in contact with me with any further ideas. This is an area that has been overlooked by all other dental websites and gives U.K. orthodontists the opportunity to interact directly with our existing and potential patients.

The careers information (Fig. 7) area contains information on how a prospective school pupil can undertake a career in dentistry, and also how dental students and post-graduates can undertake orthodontic training. The guide to orthodontic courses in the U.K. is included. Remember, a significant proportion of school children are influenced into undertaking a dental course by their own orthodontic experience and we, as part of the dental profession, have a duty to ensure concise accurate information on the speciality of orthodontics. These pages have links to the various dental school home pages form around the country.

Finally, there is a list of orthodontic/dental links. These

are links to other dental related sites that are of interest to orthodontists, e.g. British Dental Association, General Dental Council, or Derweb. Derweb is a large database of images that may be downloaded as long as the original source is acknowledged. It also has computer-assisted learning material, links to many other dental websites and even an 'on-line' bookshop.

As part of the continuing collaboration with the orthodontic societies within Europe and the rest of the world we have mutual links to other orthodontic sites. The American Association of Orthodontists, European Orthodontic Society, and European Federation of Orthodontic Societies are all there. There are also links to the *European Journal of Orthodontics* and *British Journal of Orthodontics* websites. Here, you can search the journals for relevant information and read the papers over the internet. However, you will need your subscription number for the journal before you obtain full access to the site. This is given on the address slip that is on the delivery envelope of your journal—now you know what that series of numbers is for and that it has a use.

Conclusions

The rapid expansion in internet access is impacting upon us all. The public and media use the www to gain information on all areas including orthodontics. The development of BOSweb allows us to project a clear message about British orthodontics to the world.

Useful URL's

Organization	Website
British Orthodontic Society	www.bos.org.uk
British Dental Association	www.bda-dentistry.org.uk
Derweb (THE best dental website)	www.derweb.ac.uk
American Association of Orthodontists	www.aaortho.org/
General Dental Council	www.gdc-uk.org/
British Dental Journal	www.stockton-press.co.uk/bdj
<i>European Journal of Orthodontics</i>	www.oup.co.uk/eortho/?L98
<i>British Journal of Orthodontics</i>	www.oup.co.uk/bortho/?L98
Australian Society for Orthodontics	www.aso.org.au
Pubmed (reference database)	www.ncbi.nlm.nih.gov/PubMed/
Dentanet (DPB funded)	www.dentanet.org.uk
OMNI (source of evaluated resources for healthcare workers)	www.omni.ac.uk

References

- Ainsworth, S. (1999)**
Dental Webwatch,
The Dentist, January 36.
- Downes, P. K. (1999)**
Dental resources on the internet,
British Dental Journal, **185**, 451–455.