

## Current Products and Practice

# Computer-aided Learning in Orthodontics: is there any out there?

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### Introduction

The development of the computer has had a huge influence on both the individual and society, across the whole spectrum of everyday living. The use of computers in teaching and learning has developed no less dramatically and the National Grid for Learning plans to have all schools, colleges and universities in the UK connected by 2002 (Office of National Statistics/Government Statistical Service, 1999).

Computer-aided learning (CAL) has been around for as long as the personal computer, and just as the computer has developed out of all recognition over the last 20 years, so has CAL. It has moved from simple text-based systems to full multimedia packages. The aim of this paper is to give an overview of the CAL resources open to orthodontists at the current time, and to speculate as to how they might develop.

### CAL designed for undergraduate students

In the search for some CAL to assist in your continuing professional development it seems reasonable to start by approaching University Dental Schools. The development and integration of CAL into undergraduate orthodontic courses has been driven by diverse motives. On one hand, it enables students to take control of their learning and learn at their own pace, while on the other it may reduce pressure on hard-pressed academic staff. Whatever the motive, several UK dental schools have been active in developing CAL for use in their orthodontic courses. Notable amongst these are the Universities of Bristol, Birmingham and Newcastle. Visiting the web sites of these schools gives the three differing responses when looking for CAL.

Visit the Newcastle site and follow the links for teaching resources and you will find yourself at an on-line tutorial on 'How to Trace Cephalometric Radiographs'. This useful document can be printed out, but represents an on-line handout, rather than an interactive tutorial, and no other material is available.

On entering the Birmingham site and following the links to teaching materials you are allowed a taster of the CAL available to students in the form of an on-line viva to take

you back to those exam room nerves. Whilst this is nicely laid out and quite fun to do, you are blocked from accessing the rest of the CAL material available without the necessary passwords issued to staff and students of the institution.

When you visit the Bristol site you can see pictures of their CAL room in use, but still can't get in. In contrast to the previous sites, if you show an interest in looking further for CAL you are directed to locations where commercially available packages can be obtained. We shall visit these later.

There is no doubt that there is a considerable amount of CAL available that, whilst written primarily for undergraduate dental students, would be of use to interested practitioners. Unfortunately, it is currently hidden within dental school intranets.

### CAL designed for postgraduate students

When casting your net further afield in the university sector you may point your browser at postgraduate sites looking for CAL. However, there seems to be little available until you find the web site of University of North Carolina (UNC), who can offer you the following titles on CD-ROM for \$265 each:

*The Nature of Craniofacial Growth*  
*Theories of Craniofacial Growth*  
*Growth and Development in Pre-school Years*  
*Eruption of Permanent Teeth*  
*Physical Growth at Adolescence*  
*Known Causes of Malocclusion*  
*Equilibrium Theory and Etiology of Malocclusion*  
*Facial Form Analysis*  
*Cephalometric Tracing Techniques*  
*Cephalometric Superimposition*  
*Space Analysis*  
*Ackermann-Proffit Classification*

Having sampled the initial series on facial growth, these packages are the comprehensive pieces of work you would expect from UNC, but are a little lifeless. However, a recent publication from UNC looking at the effectiveness of a CAL package on choice of aligning archwires (Marsh *et al.*, 2001) found 90 per cent of users thought the programme well done and 20 per cent changed their practice after working through the programme.

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**CAL from UK government Department of Health**

The Department of Health of the UK government has supported the development of an on-going series of CAL programs for dentists, and these are now co-ordinated through the National Centre for Continuing Professional Education of Dentists (NCCPED). Twenty-two packages are currently available, although the only orthodontic program is the Orthodontic Case Assessment package developed at Bristol Dental School. A further 10 packages are currently under development, including the management of traumatized incisors, and dental photography and imaging. Dentists working in the National Health Service in England have access to these programs through Dentanet (www.dentanet.org.uk; Figure 1), and they are also available from Postgraduate Dental Deans in England.

**Commercially available CAL**

The availability of orthodontic CAL commercially is very limited and searching the Internet revealed only three orthodontic programs available to purchase. *Practical Orthodontic Assessment: an interactive guide* by Prof. Stephens at Bristol is available on CD-ROM (ISBN: 0723610754) from Butterworth-Heinemann. The CD contains 20 exercises in orthodontic assessment and treatment planning, and guides the user through the steps involved in successfully completing an orthodontic diagnosis. It is based on the material in the book of the same title.

*Orthodontic Hyper Knowledge* (OHK; Medigit Medical Series) is the orthodontic equivalent to a *Haynes Workshop Manual*, listing the tools for the job and giving step-by-step instructions. Although aimed primarily at orthodontic auxiliaries, it would make a useful reference for anyone starting out in their orthodontic career and will come into its own for teaching orthodontic auxiliaries. OHK can be ordered over the Internet from the Medigit web site in Japan (www.medigit.co.jp; Figure 2) for 65 US dollars, and a sample is available at the web site. This is another package from Prof. Stephens and co-workers and a detailed review is available (Bearn, 2000).

The third commercially available package comes from the United States. A visit to www.cyberdentic.com (Figure 3) reveals the opportunity to purchase *OrthoCD*, a CAL package that demonstrates the use of the Tip-Edge appliance using video, animation, text, and voice for the price of \$2200, or if you want a taster \$85 for a demonstration disc.

**Internet seminars**

The widespread availability of access to the Internet has lead recently to continuing education being offered on-line. Two American sites offer you a range of on-line seminars and the opportunity to participate in live web-casts with international speakers from the comfort of your own computer—you can even ask questions! *Dentalxchange* (www.dentalxchange.com) offer the following on line seminars, typically for a registration fee of \$20 dollars:

- Clinical Implications of Light Slow and Continuous Forces*
- Esthetics and Vertical Tooth Position*
- Management of Ectopic Eruption of Permanent Molars*
- Esthetic Enhancement of the Post-orthodontic Patient*

These course are accredited by the American Dental Association Continuing Education Recognition Program (CERP), but are not recognized in the UK.

A similar venture is *DenTrek* (www.dentrek.com; Figure 4), although there are only three orthodontic related

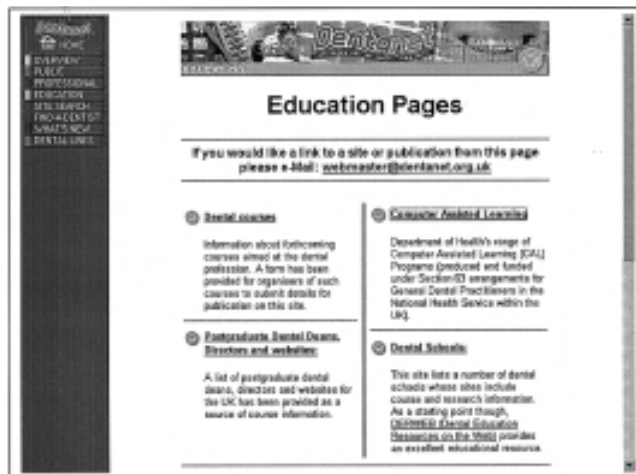


FIG. 1 Dentanet web site.



FIG. 2 Orthodontic Hyper Knowledge web site.



FIG. 3 Cyberdentic web site.



FIG. 4 Dentrek web site.

seminars. These are all on complex restorative orthodontic management, for example *Orthodontic-implant Dentistry: new solutions for the mature adult*, yours for only 35 US\$. Cyberdonic, the home of OrthoCD, also offers on-line presentations free of charge, related to the Begg and Tip-Edge appliance, including a nice potted history of Dr Begg and how he developed the Begg appliance.

#### The way forward with CAL

It appears that the main opportunity for development of CAL in orthodontics lies with academic institutions, which clearly already have considerable experience in preparing

programmes for their undergraduate and graduate teaching. Given the undoubted hard work involved in developing these packages, it is rather disappointing that they are not available for general Internet access for the benefit of the wider orthodontic community. Although the reason for this is unclear it seems unlikely that it is due to either commercial or technical reasons. Perhaps moves being considered for undergraduate orthodontic courses to move towards a more common curriculum will encourage institutions to allow free access.

The NCCPED is the major funding body for CAL development in the UK, but currently places low priority on orthodontic CAL. It appears that the market to commercially exploit orthodontic CAL on CD-ROM is small, but perhaps a model based on on-line access at nominal fees is more appealing to both developers and commercial interests. As ever with Internet-based services and products, there are few checks made on the quality of your on-line seminar or package, so remember—don't believe everything you read on your computer screen!

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