

# Educational resources on the internet for trainee doctors: a practical guide

## Aims

The quantity of educational resources which are available on the internet is enormous and the quality of these is very variable. This two-article series will provide practical guidance for doctors on assessing quality and making effective use of these resources. The second article will discuss some good quality radiology and medical learning resources available on the internet.

## Background

Over the last few years the internet has evolved at a very rapid pace and is still expanding. As a result, there has been a considerable increase in the amount of information which is available. Resources on the internet are recognized as a valuable tool in today's medical teaching. Web-based education is being increasingly used by organizations to supplement conventional teaching methods and by individuals to broaden their knowledge base.

With such a vast array of resources available, much time can be wasted trying to find the right information. Moreover, websites may not reflect the principles of learning (Alur et al, 2002). The articles in a scientific journal are peer reviewed but this may not be the case with articles on the internet. As a result, the information provided may not be accurate or may be incomplete.

One needs to be able to avoid misleading sources of information. In order to use the educational resources effectively one should be aware of ways to assess the quality of a website, which will be discussed later in this article.

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## Why use the internet in medical education?

A great benefit of internet-based learning is that it can be tailored to one's needs. One can take online courses or interactive modules, discuss clinical issues in chat rooms and watch video streaming of lectures to give but a few examples. The internet is an excellent tool for continuing professional development. Many reputable websites offer online CME (continuing medical education) courses in various specialties.

There have been significant changes in both the working hours of junior doctors and the medical curriculum. Making proper use of the resources on the internet at work or during one's spare time can strengthen on-the-job learning. Also, with advances in technology medical practice is changing rapidly. It is now vital to keep abreast of the latest developments and changes in the evidence base which the internet can facilitate.

The internet has reached far and wide. Educational resources are easily accessible in economically and geographically diverse areas. High quality educational material can be used in medical education in underdeveloped parts of the world.

## Assessing the quality of a website

Almost all of us at some point have tried to find specific information on the internet, whether it is during work to solve a clinical dilemma or to develop understanding of a particular topic during personal learning. It can often be frustrating because of the vast amount of information available and the lack of certainty about the quality of the information.

## Some basic principles

A good quality website should be regularly updated and the last date on which it was updated should be clearly stated. The author(s) should be identifiable along with contact details and their professional credentials. There should be links to other sources of information and references should be provided as hyperlinks for ease

of access. The design and the ease of navigation should also be taken into consideration. There should be a help page and technical support available.

## Methods of quality assessment

Authors in specialties such as pathology, radiology and dermatology have done much work showing that the internet is proving to be an excellent tool for learning. The potential of its use in medicine remains unexplored and there is much scope for taking this further, i.e. how to effectively use internet-based learning in all clinical specialties and ways to evaluate web-based resources. Nonetheless, the work done by other authors in different specialties can be applied to any specialty including medicine and the authors hope to extend their work further.

McKimm et al (2003) gave a very good account of the basic design and essential features of internet-based learning. Cook and Dupras (2004) outlined the qualities of a learner-friendly teaching website and provided practical guidance for developing effective educational sites by using principles of active learning. The Virtual Training Suite maintained by the University of Bristol ([www.vts.intute.ac.uk/he/tutorial/medic](http://www.vts.intute.ac.uk/he/tutorial/medic)) has developed an excellent tutorial on the use of the internet in medicine including a section on evaluation of websites (Figure 1). The authors recommend

Figure 1. The Virtual Training Suite tutorial on the use of the internet in medicine.



**Table 1. Darmoni criteria**

Institution's name
Last update
Authors
Target of the website
Grants
Justification of the site
Editorial committee
Webmaster's identity
Electronic mailbox for criticisms, comments, suggestions
Information corresponding to evidence-based medicine
Internal search engine to facilitate the search of information
General index of all html documents of the site
'What's new?' heading to quickly visualize the site's innovations
Help page
Map of the site
Regular checking of the validity of the hyper-links
In the event of modification of structure of a site, links between old html documents and new ones
Navigability: easiness of the information research
References to the original sources
Selection of external hyper-links
Distinction between internal and external hyper-links
The number of computers connected to the site and number of visualized documents

the 'www technique', i.e. always ask three questions:

1. Who: the name of the authors and the publishers
2. Where: the institute and the country of origin
3. When: when it was published and date last updated

Scarsbrook et al (2005), in an excellent article on educational resources for radiologists on the internet, added three more questions: Why, How and the Accuracy, which they felt should also be part of the evaluation process.

**Darmoni criteria**

A more objective way of evaluation has been suggested by Rolland et al (2000) by using Darmoni criteria which are widely used to rate a website (Table 1) using a 22-point system. One point is given to each criteria fulfilled and the website can be scored based on the number of criteria fulfilled. A comparison between a number of websites may also be made using this scoring system. However, this method of

assessment focuses more on the architecture of the site than the quality of the information provided. Rolland et al (2000) advocate that all educational resources should have visible marks of Darmoni criteria on the home page, which seems very rational.

**Which search engines?**

In order to use the internet to its full potential it is important to do a focussed

search so that time is not wasted going through poor quality material. Using conventional search engines like Google may give tens or hundreds of thousands of results. A more directed approach would be to use advanced search criteria in the commonly used search engines to give a more focused search. There are various portals and databases to medical information on the internet that provide reliable medical information. Some of these are listed below:

- [www.intute.ac.uk/healthandlifesciences/search.html](http://www.intute.ac.uk/healthandlifesciences/search.html)
- [www.hon.ch/MedHunt/](http://www.hon.ch/MedHunt/)
- [www.ncbi.nlm.nih.gov/PubMed](http://www.ncbi.nlm.nih.gov/PubMed)

**Conclusions**

The practice of medicine is changing at a dramatic pace and the internet is an excellent medium for keeping up to date with these changes. This article has described how the internet can be used effectively as an educational resource. The next article in this series will discuss some high-quality radiological and medical educational resources. **BJHM**

*Conflict of interest: none.*

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**KEY POINTS**

- The internet is a valuable resource in medical education today but its potential is not yet being fully realized.
- Doctors using the internet for education should avoid poor quality material and must be able to evaluate the quality of an educational site.
- Researchers in various specialties have done much work and their efforts should be acknowledged and put to use in medical education.
- Doctors need to be aware of some quality educational resources relevant to their learning so that time is not wasted trying to gather information.