

# Health Information (and Education) Consulting

## Medical Education and the World Wide Web

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### Introduction

Medical education is entering a phase of renewed change, this time driven by developments in information availability and technology. Over most of the past century, medical education has remained largely isolated from the changes that have swept through most other businesses: enterprise wide computerisation, client-centric thinking and a service philosophy. In most implementations a medical school tends to be poorly computerised, inflexible and questionably cost-effective.

The clients of the medical education process, who worldwide mostly pay for themselves (although in some countries are state funded) are guaranteed nothing for their money, not even in many instances a modern, efficient or entirely relevant educational program. Many leave medical school financially poorer and often little enriched cognitively: they are generally weighed down under a burden of obsolescent information, the important elements of which could be found by an intelligent member of the lay public faster and in an updated form directly from the World Wide Web.

The time has come to adopt the computer, the Web, distance learning techniques and effective educational strategies to create an entirely new educational experience. Curriculum developers, content experts and students need rarely (if ever) meet face to face; classrooms,

specimens and dissections will be for the most part virtual; and flexibility, convenience and student-centric thinking will be central to the planning of the entire program. Education can and must be channelled to the consumer: with these basic resources the student can be assisted to create their own personalised mini-medical school using local clinical facilities and personnel.

### Educational Goals

The goals of medical education are all too often not clearly defined. In the context of this new program we have defined our goals as to enable the student to acquire:

- An understanding of biomedical concepts and principles related to mechanisms and causation of disease as well as to treatment
- A set of inter-personal and clinical 'hands-on' skills, including being able to form productive partnerships with patients and inter-professional care team members
- The capacity to apply a logical reasoning process to the solution of individual/community problems, and to undertake a critical review/analysis of newly acquired information
- The knowledge of how to learn independently, and of how to interact with the resources which provide up-to-date access to the knowledge and understanding that underpins the practice of

high quality contemporary medicine; they will do this by accessing local resources in print, on CD and other forms, accessing remote Internet-based information resources and using current evidence-based care protocols.

In significant part there is no impediment to acquiring this knowledge when and where the student may choose: the educational program can be as flexible in terms of time and place as the student wishes (see 'Program Flexibility'). In the virtual program overseen by the author, educational materials are served across the Internet to students wherever they may happen to be located. The materials will be described in slightly greater detail in a following section (see 'Learning Resources'). In addition the students have access to a range of on-line services to support and challenge them educationally: these also are described in a later section (see 'OnLine Services').

The exception to this total flexibility in terms of time, place etc is the hands-on component (2) where student and patient (at least) need to come together (with or without the teacher), since as yet it is hard to argue that a 'virtual' practical clinical experience is effective. But for the most part learning the hands-on skills does not require hospitals or specialists: they can be learned wherever there is a competent doctor and a supply of patients.

### Program Flexibility and Student-focus

The conventional program has a number of high cost elements built in to its design:

- buildings, plant and facilities, usually in a high cost urban environment
- specialist staff (many of whom do not see education as their primary focus)
- requiring all staff and students to relocate from home to the campus

The conventional program also has major structural inefficiencies, for example:

- repetition of 'teaching' sessions involving expensive staff year after year (at all medical schools across the world) ...
- ...with an inability to repeat teaching sessions which are available only at the designated time and place - if you miss it, it's gone
- Competition for expert staff with other facilities, so driving up staffing costs and putting quality at risk where insufficient expert staff can be found/afforded
- Widespread use of outmoded educational technology and methodology; minimal use of modern information resources (eg www, graphics etc)

Using a web-enabled delivery system, and an educational methodology that support students working in large part independently, there is no reason why any of these high cost and inefficient elements should be continued. The program is therefore made available for students to use as, when and where they prefer.

To support their individual studies, there are a number of online services which enable students to share experiences with colleagues as well as to share issues and concerns with staff (see online services below).

### Learning resources

Students learn in various different ways: some are concrete thinkers and learn by example; others are more abstract thinkers and learn based on principles and concepts. Some learn more comfortably working from the generic to the specific: others work best from the specific to the generic. Any 'formal teaching' presentation will therefore engage the interest and stimulate the understanding of only a proportion of students: the remainder will find it unedifying. Most students ultimately learn from texts, written materials and notes, and recall relatively little

from lectures and presentations made in class. Students cannot be 'taught', but they can be stimulated to learn.

For this reason Universities should create realistic and common clinical scenarios ([problem-based learning](#)) of the type that are regularly confronted by a practitioner in that community ([Community-oriented](#)). The courseware should package together all the relevant study materials that are required to 'understand' and to 'manage' that clinical problem ([integrated learning materials](#)), making reference where appropriate to various text and non-text resources available locally (eg in a book collection or library) or remotely (eg on University servers or the world wide web). The student is now released from the 'lock-step' issue - students can study at their own speed, in ways that suit their personal learning styles, going over materials as often as they need in order to achieve the depth of understanding required. Furthermore by learning how to learn independent of their 'teachers', students are thereby prepared for keeping themselves up-to-date in the future when the main source of current update material is likely to be the world wide web.

### The Materials – Problem-based or case-based Learning

Every case study problem is developed along similar lines, although various different presenting formats are used, as much for variety as anything.

#### Trigger

Each problem starts with a 'trigger' or presentation, which is as true to life as possible. The scene is set, the student is told what role he is playing (primary care, secondary care etc), and the way in which the patient presents is described. The students consider the presenting information and make their plans as to how they will carry forward the encounter.

## Patient Data

Following this the problem unfolds in a series of steps designed to mimic and reinforce the clinical reasoning process. Typically the first step is that the general history that would be volunteered by the patient is presented. This is followed by the more detailed history items concerning the present condition and previous health events that the doctor explored. The third step is the basic examination findings that were elicited. The fourth is typically any special examination items that might have been suggested by the previously gathered information. And the last step in this process would be the ordering of tests and investigations to confirm or exclude one or more possible diagnoses from the differential diagnosis list. The results are typically shown in the form of real images - X-rays, scans, lab reports, and so on.

At the end of each step the student is encouraged to summarise the situation thus far, to hypothesise as to the causes or mechanisms involved, to develop a differential diagnosis list, and to plan the next step in the light of the above.

## Case Summary

At the end of this process a short synoptic statement about the case is presented, together with a list of the learning topics and issues that are raised by the case. A short introduction to the learning issues is provided, typically 1-2 pages long, outlining the main issues to be understood, and pointing the student to detailed resources in texts, CD's, videos and on the Web to further their knowledge.

## Learning

Each problem 'opens' many doors to learning, as outlined above. Each case is equipped with a fully document 'study' guide, which summarises the learning objectives to be achieved (by reference to the USMLE objectives at [www.usmle.org](http://www.usmle.org)), the topics to be studied, and the resources through which to achieve that learning and knowledge.

As well as the many published materials available to assist the student, HIC staff have prepared a large number of additional materials in the form of PowerPoint / slide presentations and the like to assist the students. In addition many of the senior students have prepared well organised study notes and guides for themselves, and lists of useful web resources which they share with other students.

## OnLine and Electronic Learning Services and Functionality

To support the students the University will need to create a number of online services and facilities, including:

1. Numerous student list-servers (or online forums), each serving the needs of students at the same stage of the course, as well as one that services all students in the University. These enable students to share information, advice, notes and comments with their colleagues. This is an invaluable aid to study, especially for some of the students who need more help.
2. Online archives where the study materials are marshalled for the students and from where they can download them. The online

resources include the problems-based and case-based studies, as well as a wide range of collected resource materials prepared by a variety of experts from different disciplines. Some are specific to a particular Block or problem, but many are of general importance and are made available to students at all levels of the curriculum.

3. Web resources ('weblinks') are widely used to provide an invaluable and up-to-date source of study materials. Vast amounts of excellent material is available on the web, and we go to considerable lengths to identify the most relevant material for the students to study in their own time - references to hard copy texts and journals are also used as an alternate study resource.
4. Online classrooms, where both slides and text can be exchanged, and where staff and students can meet together in pre-arranged groups and at pre-determined times to discuss specific advertised issues or topics. Some experience has been gained in the use of audio and video, but these have both strengths and weaknesses
5. e-'tidbits' and 'challenges of the week': students are

continually challenged by a series of cases, reports and other topical issues, which are used to stimulate thinking and reasoning. At one level these include formative assessment items, the answer to which are normally circulated about a week after the questions themselves. For some items, students may be required to send in a response to the challenge within a limited time period, after which the 'correct' response is then circulated.

6. e-Journal Club: an electronic journal club is held every week, with a different student taking the lead, preparing the presentation (normally a critique of a published paper) and responding to comments and criticisms. These (and other) student-generated materials are held in an archive for future students to study and learn from.

### Experience

Over the past 6 years HIC has gained invaluable experience with using these resources and facilities online (using the services of Taskcare) and both on and off the campuses of its clients. We have identified

models that work, as well as models that are less successful. Several clients now have 'franchise' arrangements whereby courseware and resources are provided through an associate institution to their students - in some cases they also provides the academic supervision and the final degree, although in others these remain functions of the affiliate institution.

It is now clear to HIC that the model offering the most potential in the context of developing countries is one where a 'pod' of students is attached to a clinical institution - for example a district general hospital. The physical costs incurred with this set up are close to zero. Staff of the clinics can assist students with developing their knowledge and understanding by interacting with them, and by working through the HIC courseware with them, again at little cost. All the facilities required for learning, and in particular the patients and the investigation facilities (imaging, biochemistry etc) are already there, and the students can engage immediately in useful work with the patients and the community from the very start ('community orientation').

### Conclusions and further Information

It seems inevitable that initiatives of this type must develop rapidly. The costs of this type of education are lower, both in terms of supply of the courseware, as well as in terms of student living and accommodation costs. In addition the student can in most cases remain in or near their social roots, which is increasingly important as methods are sought to maintain and strengthen the links between students and their communities, and therefore to encourage them to return to serve their communities after graduation. The overwhelming cost to student and public purse of conventional medical schools must inevitably lead to their financial failure unless they follow a similar model.

For more information about HIC's online medical education courseware and open source software delivery mechanisms, or to view a [problem-based case study](#), please write to the author or visit the London International University website at [www.liu-online.com](http://www.liu-online.com) and / or the Taskcare website at [www.taskcare.com](http://www.taskcare.com).

For further information, visit our web site at [www.hic-ltd.com](http://www.hic-ltd.com) or the London International University web site at [www.liu-online.com](http://www.liu-online.com)

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