

## Use of Information Technology in Medical Education

*"Introduce PDAs but let them not replace our stethoscopes"*

**Joshi SK**

Medical Education Department, Kathmandu Medical College

The Information Technology Association of America (ITAA) defines Information Technology (IT) as "the study, design, development, implementation, support or management of computer-based information systems, particularly software applications and computer hardware."<sup>1</sup> Today, these two terms – computers and IT - are almost synonymous and together, they have webbed the whole globe in such a way that there is not a single part in the world or a single incident that we can not know of and the amazing part is that we don't even need to leave our room. In a way, IT has brought the world to our fingertips. I am sure it won't be an exaggeration to say so.

When I collected two sacks full of medical text books from the library of a state owned Soviet medical university two decades back, I never thought that a day would come soon when no medical student would be doing such an exercise. It was a cumbersome job to stand in the queue for almost few hours, get the books on your back to your hostel and the same process. The same process has to be repeated at end of the year to submit these back. Nowadays I hardly believe that a medical student in any part of the world has to do that.

With the development in Information Technology, there has been a significant change in the medical education all over the world. The change is that majority of the medical students are computer literate these days. Instead of heavy books, the students rather carry CD-ROMs, or small drives in

their pockets and these can be used anywhere and anytime. New information on medical topics is more readily accessible via the Internet and handheld computers such as palmtops, PDA.

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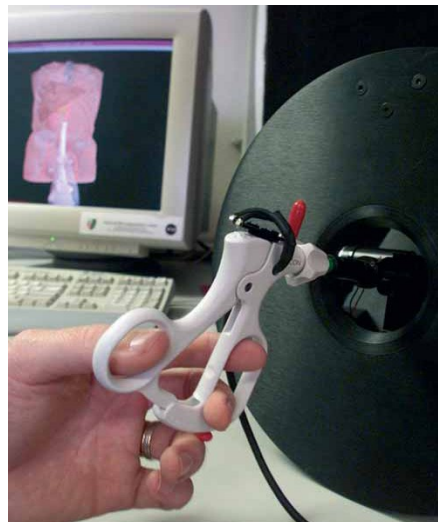
Information Technology can assist medical education in various ways such as in college networks and internet. Computer-assisted learning, Virtual reality, Human patient simulators are some options. With the help of college networks & internet, the medical students as well as the teachers may stay in contact even when they are off college. Rapid communication can be established with the help of e-mails and course details, handouts, and feedbacks can be circulated easily. Many medical schools these days use online programmes such as "Blackboard" or "studentcentral" to underline and coordinate their courses. Such programmes allow speedy access to information and quick turnaround of evaluation and messaging, and allow all tutors, assessors, and students at any site to look at the curricular context of their own particular contribution. Similarly, the Internet provides opportunities to gain up-to-date information on different aspects of health and disease and to discuss with colleagues in different continents via net conferencing. Free access to Medline, various medical journals, online textbooks and the latest information on new development in medicine also encourages learning and research.

As computer assisted learning (CAL) is gaining more popularity, these days many medical schools encourage the students to

purchase computers, and others are making strategies for integrating medical informatics into the curriculum.<sup>2,3</sup> CAL is considered as an enjoyable medium of learning and very suitable for conceptually difficult topics. Interactive digital materials for study of histopathology, anatomy, heart sounds are used widely. Development of anatomical three dimensional atlases of various internal organs using computed tomography and magnetic resonance imaging are very illustrative and help the students to understand the subject matter clearly.

There are real time visualization of surface based anatomy on any personal computer featured with advanced "speed up" techniques. The data are visible human body and students can build and deconstruct a 3-D model of brain and head etc. Similarly, Advanced Life Support (ACLS) simulators and Haptics "the science of touch"

simulators are used in medical education to develop various clinical skills such as ECG interpretation, appropriate intervention such as ABC, drugs, injections, defibrillation without working on a real patient. These days, highly sophisticated simulators "virtual reality" with highly advanced medical simulation technologies and medical databases are available in the advanced medical schools that expose the medical students to the vast range of complex medical situations. It can emulate various clinical procedures such as catheterisation, laparoscopy, bronchoscopy etc. With new technology, the students can virtually go inside each and every organ and see how they actually look like from outside as well as from inside. We now have proofs that we can have virtual trainings that improves the surgical skills of young surgeons.<sup>4,5</sup> Is that not a wonderful gift of IT? Yes, there is no doubt.



A laparoscopic impulse device coupled with a virtual surgery simulator<sup>6</sup>

Not only that, these days, we can also have **web based learning**.<sup>7</sup> The learning materials are uploaded in the internet, so that anyone in any corner of the world can read them. I appreciate this system very much not only because we can learn more things but also because it sends a message across the

world that education and knowledge are basic human rights and we should rise above the national and political barriers and share knowledge with all.

In more organised forms, we can even have formal **online medical courses and**

**trainings** which are checked and certified by particular medical councils. The courses are designed by medical experts, then peer reviewed and edited by doctors. Students or doctors can attend those courses like any course in a medical college. At the end of the course, one can also get an evaluation and grades or credits accordingly.<sup>8</sup> This system is a perfect one because one does not have to move from one place to the other to join the courses, in which case he would have had to take a break from his present job and also spend a lot of money on travel and accomodation besides the regular fees for the course. And when one has to manage so many things before he could join a course, he would probably think not to join it at all. So, there are few doctors who train and attend the course which is detrimental to the medical education system. But with online courses, none of such problems seem to arise. In addition, i am sure a lot more doctors would take the course which will raise the standards of health care delivery system. The same applies to medical seminars and conferences. Many doctors can't attend them just because he can not afford the high expenses. This is specially true for the doctors in developing countries. But with video conferencing and live lectures, IT has provided a perfect solution.

### **Information technology and medicine**

Like any other field, medical system has also updated itself with information technology. IT is widely used in all medical and surgical disciplines. Let me pick an example to see how IT could improve the patient care in a hospital. In Sweden, every person has his personal identity number<sup>9</sup> and his every personal details including his health records are digitalised and uploaded in a network system. So, as soon as he enters any health centre, with his identification number, the doctor can get detail

information on his medical history including the past surgeries, major events and any on going treatment details. Not only this, doctors from different specialities can review the patient at the same time though they are working in different corners of the hospital. This means that a patient with abdominal pain would not have to go from his general practitioner (GP) to the radiologist, then to the pathologist, then to a surgeon and back to his GP after a long day of painful trip inside the hospital to finally get his prescription for the simple pain. Is it not a better service to the patient that he does not have to take such pain anymore? The bottom line is we need inter speciality cooperation which we call an integrated approach to a patient. And this is very important because only with such co operation can we deliver quailty health service. And thanks to IT, which has made it possible.

### **Information technology for the developing countries**

We all agree that there is a huge difference between the education system and quality of the education between the developing countries and the developed ones. With limited resources, the developing countries can not afford big researches, big conferences and scientific gatherings. As I mentioned above, even mere participation in such events becomes difficult. The colleges have poor infrastructures, they don't have enough trained faculties. Sometimes, due to small number of faculty members and learning resources, colleges have to cut down on the number of students they enroll in a year. In such cases, as far as i can see, only IT can provide a rescue. We can design the courses that every students can take at home, we can have discussion forums where the teachers and students can have interactive sessions. It does not sound

ethical to allow many students in the operation theatre considering the increased risk of contamination and unnecessary crowd. But we can record all the surgical procedures and let the students watch and learn which I guess would be equally informative and effective as going to the operation theatre itself.

The other problem medical education system faces in developing countries is the access to journals. Due to limited resources, they can not subscribe all the renowned international journals, which make a very essential part of medical education. Infact, reading journals keeps the doctors and students updated with every new therapies and concepts and it's what makes the doctors smart. So, what do we do now? Yes, we can definitely turn to IT for help. Its the IT that has made it possible to have online databases like HINARI, PUBMED, Cochrane etc and online journals like BMJ, Nature, Annals, and a lot others. Is that not a privilege we get through IT?

IT has also helped a lot to promote research activities in developing countries. First, it gives access to many previous research articles on the topic, so that people could learn about the methodology previously designed. Next, they could design their own methodology so that the results could be comparable with the previous ones because non comparable findings are not much worth. Besides, unless and until, the findings of a research are published and reach out to numerous people, it does not carry any significance. And, only with IT can we have huge number of readers because very few countries and associations subscribe journals where most of our research articles are published. So, IT has helped to put our national journals in an international arena.

Had they not have an online version, no body would have heard of them.

Problem based learning and evidence based medicine are supposed to be the pillars of modern medicine and education system. The essence of these systems lie in the study of researches, literatures and experiments and it requires access to vast amount of information which only internet can provide. So, IT has become indispensable in the present day medical education system.

Besides these, there are many benefits of e-learning, which encourages their use<sup>10</sup>:

1. Self paced courses
2. Available anytime, anywhere
3. Guaranteed consistency
4. Personalised and relevant
5. Easily updated
6. Easy tracking and reporting
7. Reduces logistical costs (travel, space, materials)

### **Difficulties ahead**

IT seems to have a solution to everything but then, have we been able to implement all our ideas about IT in medical education? Perhaps NOT! There are many hurdles in front of us and the path is not easy.

First major problem is the technology. Computers and internet services are still a matter of luxury in many places of our country and even in cities, the services are not satisfactory. Slow internet connections and non-reliability of ISPs are simply enough to discourage the use of IT in education. On the top of these, the daily powercut is a heavy blow. Usually, Personal digital assistants (PDA) are supposed to be very useful and handy to use in wards. But, their high prices simply make them unaccessible.

What ever is said about free access to information should be taken with caution. Because, at times it proves to be an exaggerated statement. Many big medical researches are conducted and many new things discovered. A lot of new theories are proposed and they are published as well. It would have been very nice to know of all those and implement them in health care system. But, we, specially the developing nations get hiccups on the very first step – we don't get access to those information at all. We are forced to subscribe to those online versions as well which we can not afford. So, IT doesn't seem to help in such conditions.

Another hurdle in proper use of IT in medical system is that not everyone know how to use computers and IT. Specially, most people of the older generation don't have much idea of it. So, in such condition, how can we expect to computerise our education system. It does not seem easy. The other problem could be quality control. If we see the online study materials, there are millions of websites and materials. So, how do we rate them, how do we filter them? It's a big challenge in itself. If the students get the wrong information instead of the right ones, it would be the biggest backfire we can ever expect.

One more difficulty in integrating IT and medicine could be the fact that students have to learn both of the specialities. Often, there are reports and discussions that medical students have too much to study and they are unnecessarily burdened with loads of studies. On the top of that if they have to learn computers and also many other application programs in order to be able to use IT efficiently, won't that be an extra burden to the students? Won't it affect their studies?

### **Conclusion:**

There is no argument over the influence of IT in medicine and education. But in context of the developing countries, there are still many areas which need to be improved before we could utilise IT to its full extent. In the meantime, it would be best for the developing countries to make a balance between the traditional education system and the new IT based education system.

At last but not the least, however advanced the technology gets, it can never replace the interaction the doctors and students require with the patient and the clinical judgements which make great doctors. So, in the pursuit of modern technologies, we should be careful that the doctor patient relationship do not get overlooked in our medical education system.

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