Bulletin of N T T C

Vol.7, No.1, March 2000

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Theme of this Issue

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INFORMATION TECHNOLOGY IN MEDICAL EDUCATION

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Published by
NATIONAL TEACHER TRAINING CENTRE (NTTC)
Jawaharlal Institute of Postgraduate Medical Education & Research (JIPMER)
Pondicherry, India

Editorial

JOIN IN OR BE LEFT OUT!

MEDICAL APPLICATIONS OF THE COMPUTER

K.R. Sethuraman

INTRODUCTION

Throughout the history of human civili-sation, scientific and technological revolutions have always created apprehension and mistaken beliefs before finding universal acceptance. The electronic age and the computer revolution have been no exceptions. While the earliest computers, based on valves and transistors, were large and were operated only by full-time professionals, the invention of the microprocessor "chip" ushered in the computer revolution. The chip based compu-ter is cheap and compact enough to be handled by lay people. Availability of easy-to-use program-mes have made a microcomputer as easy to operate as any other electronic device, like a TV, VCR or an Oven.

BASIC CONCEPTS

Four functions: The computer is an elec-tronic device with a microprocessor made of silicon chip at its core. The chip processes nume-ric, graphic, audio or text data in four basic ways: (1) Storage, (2) Retrieval, (3) Arithmetics, and (4) Logical comparison.

These four functions form the basis of all computer

processing, be it a home-computer or a super-computer. It is human ingenuity that has manipulated the computer to function in incredibly diverse manners. By now, there remains hardly any human activity which has not been assisted by a computer. An analogy can be drawn between the motor and the computer. Just as the motor assists all human activities involving power and movement (from a motorised tooth brush to a lunar vehicle), the computer can assist all activities involving the human mind and nervous system.

FOUR COMPONENTS

If the central microprocessor can be considered the "brain", then the other vital components of a computer can be equated thus: Input devices - Visual, auditory and somato-sensory input, etc.; Output devices - Musculo-skeletal system and speech; Storage devices -Memory part of the brain, both temporary and permanent. Thus, the four basic components of a computer are:

1. Central processing unit (CPU)
   e.g., Pentium III chip

2. Input devices
   e.g., Keyboard, mouse, scanner, camera, microphone, etc.

3. Output devices
   e.g., Video monitor, printer, robots, etc.

4. Storage devices
   e.g., chip, floppy drive, hard-disk drive, CD-ROM, DVD, etc.

Modem (modulator-demodulator) and other connecting devices are `input-output' devices that help form a network of computers which can exchange information. This is the basis of Internet.

These form the hardware of a computer system.

While humans use languages, a CPU can only use binary code (machine code). As it is difficult for human

language to be broken down and written in machine code, modern computers use high level languages. These have English-like words which we can understand and use to write instructions and data. The computer uses an electronic interpreter which converts these into machine code during "input". It also converts the computer's binary output into one that is intelli-gible to humans for display on the video screen or as audio signals.

A *language* for the computer is like any other language. It has grammar, syntax and vocabu-lary. Like human languages, there are hundreds of computer languages with different versions or dialects. Some examples are BASIC, C, JAVA, HTML, etc.

Programme is an entity written in any language. It consists of a sequence of instruc-tions telling the computer how to perform a certain task. A programme may be a simple one to display the result of 2+2 or a complex one to calculate the ideal flight path to the moon.

Package refers to a collection of programmes that are interrelated in order to achieve a task or a group of tasks. For example, a statistical pack-age may consist of different programmes, each relating to a statistical function.

Utility is the name given to a sequence usually compiled or written in machine code to accomplish specific tasks in using a computer. Word processor is a utility to perform text processing on a computer. Creating, deleting, editing and appending text matter are possible with this utility.

Language, utility, package and programme are collectively known as *software*. Unlike hard-ware, the software is not concrete and can only be perceived during its action on the hardware. An analogy would be that of brain (hardware) and thoughts (software).

Medical Use of the Computer

Pre-requisites for computerisation of a task: As the current day computer is only capable of four fundamental functions mentioned earlier, the following prerequisites are essential before one thinks of computerising a task.

a) The task must be capable of being broken down into a set of simple steps that are unambiguous.
b) Instructions must be linear in progression from start to finish.
c) The data needed for the instructions to be carried out should be available or have been derived by an earlier step.

Any task in any field of human thought and action that satisfies these prerequisites can, in theory, be computerised. Vast area of medical learning, medical practice and medical adminis-tration satisfy the prerequisites for compute-risation. Thus the crowded medical curriculum, the busy doctor and hospital administration can benefit by the assistance of a computer.

Let us now consider some of these areas in brief.

1. Hospital Management Information System (HMIS):

Most hospitals have raw data available at an elementary level like number of cases treated, money collected, etc. Systematic information processing is a tedious job; manual systems, therefore, tend to be incomplete, inaccurate and elementary.

The computer can assist at four levels of information processing in a hospital.

Level 1: Office Automation

It is the simplest of the four levels. An example of an automated office would be the computerised reservation done for air or train travel. We all know the advantages and effi-ciency of such a system.

Level 2: Transaction Processing

At this level, all transactions that take place in the office are recorded and stored for retrieval later. In a hospital, it could be cash transactions, doctor-patient transactions, laboratory-patient transactions, etc. Actually, this level is an exten-sion of Level 1. In a well-designed automated system, the data entry at Level 1 gets sorted out by the system for storage of various transactions under different heads. Hence, it is easy to keep a check on the total transactions on an hourly, daily, weekly or monthly basis.

Level 3: Information System

At this level, the raw data of Level 2 is analysed in different ways to generate usable information about the performance of the hospital as a whole and also various subsections of it. This level is targeted to help middle level administrators of a hospital to generate meaningful hospital information, based on hard data and statistics rather than instinct and impression (as happens in most hospitals now).

Level 4: Decision Support System

This is the apex of an information system where the various implications of information generated at Level 3 are analysed and future projections (forecasting) made. Based on these short-term, medium-term and long-term projec-tions, various decisions are taken by the hospital administrator. Again, the decisions can be based on a scientific basis rather than on instincts and impressions.

In the pyramidal configuration of a hospital information system, it is essential that data entry at Level 1 has to be comprehensive, error-free and systematic to provide reliable information at Level 3 and valid decisions at Level 4.

2. Knowledge Based System (KBS)

Knowledge-based system is also called "Expert" system. The former term is more accu-rate and less assuming. A diagnostician has a vast knowledge-base of the clinical characteristics of various syndromes and diseases. The person also uses a set of rules and algorithms for diagnostic inference. Whenever a set of case-data is provided, the diagnostician uses the inference process to compare the case-data with the knowledge-base. When a match is found, then the case is diagnosed and decisions on manage-ment are taken.

A computer can be programmed to play the role of a diagnostician, if it is provided with the knowledge-base, rules and algorithms for diag-nosis (inference-engine) and the process of collecting and analysing case details. The Modes of KBS are as follows:

Algorithmic Mode: Whenever a problem can be solved by a set of questions having a yes/no response, then the algorithmic mode is feasible and easy to implement (e.g., management of acid-base imbalance).

Statistical Mode: Wherever probability score or discriminant function is available to statis-tically assess the likely diagnosis, then this mode is feasible (e.g., assessment of coronary or cancer risk).

Rule-based Deduction Mode: When a set of conditional rules helps to solve a problem, then this mode is feasible (e.g., selection of antibiotic therapy).

Cognitive Model or Abduction Mode: Expe-rienced clinicians use this method of "hypothesis and test" for most problem-solving in practice. For example, flank pain as the presenting symptom would initiate "possible renal stone" as a hypothesis and further questions are asked to clarify the issue. When a vast area of medicine needs to be covered, then this mode is suitable (e.g., internal medicine).

Anecdotal Mode: It is sometimes used by experts in solving complicated problems ("I have seen similar problems earlier"). Unusual and exotic syndromes which may not fit into the other modes explained earlier may be suitable for this mode of problem-solving.

A lot of money and manpower is being put into development of KBS and artificial intelli-gence. In a few years' time, we may find large KBS, incorporating many modes to help solve clinical problems. Especially in the setting of superspeciality centres, KBS may help in early identification of problems, avoid unnecessary investigations and increase the efficiency of the medical team.

3. Medical Research

The computer can assist medical research in many ways. Model building and simulation experiments help in getting "a feel" of the problem to be solved and in determining the best (or optimum) way to conduct a research project. Such prototype models ("dry-runs") help avoid the limitations of a project that are often noted in retrospect when it is too late to modify the study protocol. Unnecessary killing of animals can be avoided.

Computer-based literature search is fast, accurate and efficient. Medical Literature Analysis and Retrieval System (MEDLARS) was established in 1964. One of its large database is MEDLINE which is based on the Index Medicus.

A search could be "on-line" (meaning imme-diate search at the time of making a request) or "off-line" (request by mail, phone, or telex being attended to in batches at a later date).

4. Computer-assisted Learning (CAL)

Computer as a Tool of Learning

The computer can be made to assist learning in many ways:

1. Dense storage of data in an organised form, e.g., a large textbook could be stored in a classified manner on a 13 cm. disk.
2. Quick access to the data-base in milli-seconds.
3. Logical comparison of the learner's respon-ses with the stored key and evaluation of the learner's performance.
4. Instant feedback of evaluation (both forma-tive and summative types).

Computer as a Teacher

The computer can never replace a teacher. It merely complements a teacher's role. However, in some areas of interaction, it may be better than a human teacher. e.g.,

1. It never gets bored or irritated
2. It never makes mistakes on its own
3. It permits individual attention
4. It permits the learner to decide his own pace of learning.
5. A well created lesson uses multi-media to enrich and enhance learning.

Roles for Computer in CAL

A variety of roles/modes are possible in CAL, giving much flexibility.

a) Drill and Practice mode: The learner can learn facts and memorise them by the drill-method (e.g., use an MCQ bank for practice).

b) Tutorial mode: In this mode, a module (lesson) consists of presentation of the content in a structured way, task-prescription to elicit learner's response, and instant feedback and reinforcement to the learner. This mode, if used well, could result in 90% retention of the content (compare with 30% retention after the best lecture!).

c) Laboratory mode: The computer could be programmed to simulate a variety of biological processes to supplement or do away with labo-ratory experiments. The learner explores various options and learns by inference.

d) Case-simulation mode: A variety of diag-nostic and therapeutic problems of the patient management type could be effectively compute-rised. This has proved quite useful in learning problem-solving, the highest cognitive domain. Simulated Patient Management Problems (SPMP) is one of the most useful areas of CAL in medical education.

e) Consultant Mode: It is one of the frontier areas now. Knowledge based "Expert" program-mes have been devised using artificial intelligence. These could bring the expertise of a consultant within easy reach of a primary care physician. Real life experts are also accessible by video-conferencing.

f) Manager of Educational Process: Computer based management-information-system (MIS) could keep track of student performance and offer suitable advice to make the process more effective (see HMIS).

5. Computerised/Automated Equipment

In contrast to the preceding discussions where a computer could be flexibly programmed to perform widely varying tasks, this section deals with "dedicated" micro-processors/computers.

Dedicated computers are pre-programmed to perform specific tasks, usually control an equip-ment and gather, analyse and present data acquired from the equipment. Ultrasonographic and CT scan equipments are some examples. "Smart" equipments have a built-in self-diagnostic programme. This enables one to avoid a lot of errors in handling the equipment and also makes servicing easy and fast.

Robots which could be programmed to help in tedious or highly skilled tasks are also under development. The most spectacular in the medical field is a robot that can assist a neuro-surgeon by pinpointing the site for stereotactic surgery.

Computer assisted devices to help handi-capped patients to visualise, to hear, to move around or to perform various psychomotor tasks have been made.

Summary

An understanding of the four basic functions of a computer (arithmetics, binary logic, storage and retrieval) will make one aware of the simplicity, inflexibility and fault-intolerance of a computer as compared to the human brain. What the computer lacks in complexity, it makes up in its speed of operation and consistent accuracy.

Human ingenuity has made computers very versatile in their functions. This includes many areas of medical education, medical research and hospital management. It is an enlightened doctor who is not afraid of technological progress and, instead, tries to understand and use it to improve his efficiency. Computerisation is one such progress awaiting the enlightened ones to come forward and benefit from it.

INTERNET IN AN EDUCATIONAL SETTING

K.R. Sethuraman

Introduction

Eric Ashby, a historian has said that Information Technology (IT) spearheaded by the computers is the fifth revolution in Education, the other four being, formal education by "guru" (teachers), invention of writing, invention of printing and the discovery of educational science.

IT has grown by logarithmic proportions in the past twenty years. Within the next two years, the civilised world is likely to be totally net-worked by advances in networking. Cable network technology, to be adopted by VSNL in the near future, will take IT to rural India and make it affordable as one can use the existing TV and its cable connections for accessing internet and the 800 million information-pages connected to it.

Such vast resources, when available and accessible to all, will necessitate all the medical educators to take a few corrective steps. We can not and should not let it overrun us but learn to ride the tide and master the use of Internet in our profession. As vast amount of latest information is available to every one, our role as the expert provider of information is no longer valid; we have to metamorphose into expert managers of information and educate our students on how to apply the information usefully and wisely. We should be able to channel the vast information into aquisition of relevant knowledge and apply it critically to gain insight and wisdom.

Are we ready for these new roles? The following brief and basic introduction has been down loaded from the Internet and edited for those medical educators who are yet to adopt Internet as an educational aid.

What is the Internet?

The Internet is a collection of more than 20,000 inter-connected computer networks around the world that make it possible to share information almost instantly. The networks are owned by countless commercial, research, governmental, and educational organizations and individuals. The Internet allows the more than 20 million computers and 150 million users of the system to collaborate easily and quickly through messaging, discussion groups, and

conferencing. Users are able to discover and access people and information, distribute information, and experiment with new technologies and services. The Internet has become a major global infra-structure for education, research, professional learning, public service, and business and is currently growing at the rate of about ten percent per month.

What are the benefits of using the Internet in the classroom?

The Internet expands classroom resources dramatically by making many resources from all over the world available to students, teachers, and medical specialists, including original source materials. It brings information, data, images, and even examination software into the class-room from places otherwise impossible to reach, and it does this almost instantly. Access to these resources can yield individual and group projects, collaboration, curriculum materials, and idea sharing not found in schools without Internet access.

Internet access also makes contact with people all over

It is always best to start internet browsing in your own machine, but feel free to use e-mail first until you get familiar with the use of the equipments involved. If you have an account with one of the internet service provders (ISPs), such as VSNL/MTNL or Satyam OnLine", and setup your computer and its modem to log in through your telephone line, you are ready to dive into the world wide web. With a little practice, it is as easy as watching and channel surfing on cable TV.

How do I find out what's new on the web?

There are excellent sites that offer you regular updates. You can become a member of the electronic BMJ at *www.bmj.com* and get weekly newsletter on latest articles in the medical topics of your choice. Medscape at *www.medscape.com* is currently rated as the No.1 medical site. Its membership is free. You can access medline abstracts, standard treatment guidelines, full articles, study specially prepared CME lessons and get weekly abstracts of latest articles pertaining topics of your chioce. The guidelines are useful and even have a sort of "expiry date" mentioned! (See the appendix for more sites).

How can educators incorporate this resource into their busy schedules?

Most educators learn about the Internet just like they have learnt about any new teaching tool or resource. Those who do so feel that it is well worth the rich rewards. It's important that computers used to access the Internet are readily available. Many features of the Internet, such as the availability of online library catalogs and information articles, will actually end up saving considerable and expense and time once an instructor learns to use them. There are new tools being developed all the time to make Internet resources more easily accessible through smart information "search engines".

the world possible, bringing into the classroom experts in every content area, new and old friends, and colleagues in education. With access to the Internet, your site can become a valuable source of information as well. Consider the expertise in your school which could be shared with others around the world. The isolation inherent in the teaching profession is well-known among educators. By having access to colleagues in other parts of the world, educators who are able to use the Internet do not feel isolated.

As a hands-on classroom tool, the use of networks can be a motivator for students and their use encourages the kind of independence and autonomy that many educators want their students to achieve in their learning process. Because class, race, ability, and disability are removed as factors in communication while using the Internet, it is a natural tool for addressing the needs of all students. Curricular reform, which is much on the minds of many educators today, can be supported by the use of the Internet as one of many educational tools.

How can I access the web?

Google is a top search engine created at Stanford University. It is very fast and gets you all the web site addresses (URLs) related to the topic chosen by you within a few seconds. Similar search engines are now part of all major sites like the BMJ, Medscape, Lancet, Americal Medical association, WHO, CDC and PubMed (Medline, Toxline, etc).

As the value of the Internet as an educa-tional resource becomes more evident, the college will need to look toward building the time to use it into educators' schedules.

Where does my school get the money for connec-ting to the Internet?

Although budgets are impossibly tight in most colleges, the cost of an Internet connection can be squeezed from the budget when its value becomes apparent. Costs for a low end connec-tion can be quite reasonable. The challenge facing those advocating an Internet connection sometimes has less to do with the actual cost than it has with the difficulty of convincing administrators to spend money on an unfamiliar resource.

In order to move the Internet connection closer to the top of your college's priority list, consider at least two possibilities. First, your college may be in the process of reform, like setting up of a "Medical Education Unit" (MEU). Because use of the ***Internet shifts focus away from a teacher-as-expert model and toward one of shared responsibility for learning***, it can be a vital part of an MEU and of reforms.

Second, to demonstrate the value of a connection, actual Internet access is more useful than words. While this may sound like a chicken-and-egg situation - "I have to have Internet access to show Internet's usefulness" - some organi-zations will provide guest accounts on an Internet-

connected computer for people in colleges who are trying to convince others of the value of an Internet connection and the ease of use of the graphical and intuitive software currently available.

Are there files on the Internet that one would not like their students to get? How can students be kept from accessing this objectionable material?

If your college has a direct Internet connec-tion, it is possible to use a software programme that locks out access to X-rated sites to prevent students from accessing objectionable material. However, everyone on the network, including students, is able to download files from public "Internet Cafes", some of which contain materials that just about anyone would consider objec-tionable for students.

In any case, schools need to exercise reason-able oversight while realizing that it is almost impossible to absolutely guarantee that students will not be able to access objectionable material.

How do we keep "viruses" from attacking all our computers if we get connected to the Internet?

If you use the Internet only to exchange data (such as sending e-mails, or down-loading text, pictures or audio), then the electronic virus is generally not a problem. The real concern is when you download software programmes and run them on your own computer. Any programme you download over the network and run could have a virus. For that matter, any programme, whether on tape or a disk, even commercial software still in its original packaging, might possibly have a virus. For this reason, all computers should have virus protection software running on them. Virus checking software is available free over the Internet from the Computer Emergency Response Team (CERT), which is run by the US National Institute for Standards and Technology (NIST). The Anonymous FTP host computer is *ftp.cert.org*.

For this reason, it is important that colleges develop clear policies to guide students' use of the Internet and establish rules, and conse-quences for breaking them, that govern beha-viour on the Internet. Additionally, colleges should consider integrating issues of technology and ethics into the curriculum.

Another possibility is to control the times and opportunities that students have to access the Internet, and only allow access under supervision. This is a less desirable option than teaching the ethics of Internet access as a matter of course, but may be used in combination with other methods to ensure the integrity of the college, its students, and its educators.

Appendix - 1

BASIC GLOSSARY

WWW (World Wide Web)

A hypertext-based, distributed information system created by researchers at CERN in Switzerland. Users may create, edit or browse hypertext documents. The clients and servers are freely available. The WWW servers are inter-connected to allow a user to traverse the Web from any starting point; in addition, many other servers such as WAIS and Gopher have been incorporated into the WWW servers.

A *connection*, usually made *via* modems, between two computers (or servers) over standard voice grade telephone lines.

Browser

To access the web, you run a browser programme. The browser reads documents, and can fetch documents from other sources. Information providers set up hypermedia servers which browsers can get documents from..

Protocol

A formal description of message formats and the rules two computers must follow to exchange those messages. Protocols can describe low-level details of machine-to-machine interfaces (e.g., the order in which bits and bytes are sent across a wire) or high-level exchanges between allocation programmes (e.g., the way in which two programmes transfer a file across the Internet). Hyper-text transfer protocol (http://) is the current standard for exchange information through Internet (see Hyper-text).

TCP/IP (Transmission Control Protocol/Internet Protocol)

TCP/IP is named for two of the major communications protocols used within the Internet (TCP and IP). These protocols (along with several others) provide the basic foundation for communications between hosts in the Internet. All of the service protocols, such as FTP, Telnet, Gopher, use TCP/IP to transfer information.

Hypertext

In a hypertext document, if you want more information about a particular subject men-tioned, you can usually "just click on it" to read further detail. In fact, documents can be and often are linked to other documents by completely different authors -- much like foot-noting, but you can get the referenced document instantly!

Hypermedia is a superset of hypertext -- it is any medium with pointers to other media. This means that browsers might not display a text file, but might display images or sound or animations.

Download

To copy data from a remote computer to a local computer. The opposite of upload.

Upload

To copy data from a local computer to a remote

computer. The opposite of download.

E-Mail (Electronic Mail)

A system whereby a computer user can exchange messages with other computer users (or groups of users) *via* a communications network.

The first part of the URL, before the colon, specifies the access method. The part of the URL after the colon is interpreted specific to the access method. In general, two slashes after the colon indicate a machine name or location of the Web site. The third part after the dot (.) refers to the type of web site - *.com* for commerce, *.edu* for education, *.org* for organisations, etc.

[Internet is the best resource for learning more about internet. Just log into www.google.com and search for top 10 sites on "internet learning resources". Carry on from there following the various links and in no time you will know all there is to know!

- Editor]

[For the advanced user of Internet, we offer this Appendix-2 on Websites and Search Engines related to Medicine *(Source: Haroon Ashraf Lancet 1998; 351 (suppl I): 15-17)*.]

Appendix - 2

TOP MEDICAL WEBSITES

The following web sites have been chosen for their in-depth coverage of medicine online and ease of use. Because most of the sites listed are gateways to thousands of other medical web pages, book marking just any one of them should ensure that you are kept informed and upto-date.

Medical Databases and Index Sites

BioMedNet (http://biomednet.com/)

BioMedNet is an award winning site with over 100 000 members that offers free access to "hundreds of full text publications in biology and medicine." Some articles and all the abstracts are free, and the full-text articles can be purchased on-line. The site offers an evaluated Medline service with full-text links, expert annotations, and connections to over 1000 libraries.

Cliniweb (http://www.ohsu.edu)

The Clinweb site is an index and table of contents of clinical information on the world-wide web. It has recently been expanded to include nearly 10,000 URLs indexed by terms from the Medical Subject Headings (MeSH) Anatomy and Disease trees.

Doctor's Guide to the Internet
(http://www.pslgroup.com/docquide.htm)

Doctor's Guide to the Internet is a clear and simple to use website that collates global medical news and information services with a view "to promote informed and appropriate use of medi-cines" by doctors and their patients. The medical resources for doctors and information for patients are divided by type, ranging from lists of all available online journals to medical site direc-tories covering almost every medical issue.

URL

URL stands for "Uniform Resource Locator". It is a draft standard for specifying an object on the Internet, such as a file or newsgroup. URLs look like this: *http://www.bmj.com* (the URL address of British Medical Journal).

Global Health Network
(http://www.pitt.edu/HOME/GHNet/GHNet.html)

Global Health Network (GHNet) is an alliance of experts in health and telecommuni-cations who are developing a health-information structure for the prevention of disease in the 21st century. The GHNet team has experts from the World Bank, NASA, AT&T, IBM, the Pan American Health Organization, and WHO. The site contains links to international and national medical governmental and non-governmental organisations and a vast list of global public health resources from around the world.

Journal Club on the Web
(http://www.webcom.com/mjljweb/jrnlclb/index.html)

This web site is an interactive medical "journal club". Every two weeks, the site author, Michael Jacobson, comments on articles from recent medical publications. Feedback from readers is appended to the article summaries. The articles are primarily in the field of adult internal medicine and mainly from the *New England Journal of Medicine* and *Annals of Internal Medicine*.

MEd Guide
(http://kernighan.imc.akh-wien.ac.at/stz/plattner/Medguide plus.html)

MEd Guide is a "guide to medical education and related resources on the Internet". A simple way to use the site is via the specialities index, which subdivide into online journals and educa-tion resources for your chosen subject. The site also links to catalogue information from libraries all over the world via the OPACS system or the worldwide web.

Medical Matrix (http://www/medmatrix.org**)**

The Medical Matrix website is a compre-hensive list of "full-content, unrestricted access, Internet clinical-medicine resources". The sites described are ranked according to quality, peer review, full content, multimedia features, and level of clinical content. A key feature of Medical Matrix material is that it has been designed for quick access to medical documents so that they can be used during the time

span of a patient visit.

Mednets sets out to provide a complete information-gathering service for the patient, physician, and healthcare providers. The site offers several search engines including Medline, and links to resources on over 40 specialist subjects. For patients, the site offers pages of links covering medical information and advice. For general interest Mednet has included links to most of the major on-line news services and Internet search engines to explore subjects as diverse as air travel and farming.

Medscape (http://www.medscape.com/)

See article.

Medsurf (http://www.medsurf.com/)

MedSurf is an Internet health guide for physicians and their patients. Sections of the site such as Medicine Bag are for doctor's only, and contain up-to-date information on "time saving technologies, advanced treatment alternatives, aging research and upcoming educational forums". Medsurf also offers doctors risk-assessment software and data such as Remaining Lifetime Fracture Probability (RLFP) package, which allows assessment of a patient's susceptibility to osteoporosis.

PubMed (http://www.ncbi.nlm.nih.gov/PubMed)

PubMed is a project developed by the National Centre for Biotechnology Information, located at the US National Institutes of Health. PubMed has been created in conjunction with biomedical publishers as a search tool for access-ing citations and linking to full-text journals. It is expected that access to additional National Library of Medicine databases will be added in the future.

Reuters Health (http://www.reutershealth.com/) javascript:void (0)javascript:void(0)

Reuters Health Homepage

Reuters Health Information produces global health and medical news services daily, to keep both professionals and consumers abreast of breaking news stories in healthcare. Alongside medical news stories the site offers a searchable news archive and drug database.

Six Senses Review (http://www.sixsenses.com/)

The Six Senses programme evaluates health care and medical web sites based on six criteria: content, aesthetics, interactivity, innovation, freshness, and character. The sites are divided into specialist sections and links to each site are provided alongside the content reviews.

Webdoctor(http://www.gretmar.com/webdoctor/)

If the websites described above do not have the information required then the next step is to use one of the search engines shown in panel 2. Sometimes, it is more useful to key an inquiry into a search engine to open up all possible avenues rather than trawl around your favourite websites. Note that the Virtual Library is not a search engine

Mednets (http://www.internets.com/mednets/)

Webdoctor is a comprehensive library of over 10,000 documents and websites, designed "by physicians for physicians". The resources are divided into specialities and diseases. From there the user is able to link to online journals, discussion and news groups, image databases, case studies, and mailing lists. The site has sub-sections on the latest jobs, a bookstore, and an entertainments section covering areas from aviation and space to movie reviews and travel.

Journals

Nearly all the sites mentioned above have links to medical and scientific journals on the Internet. Panel 1 gives the website addresses of some prominent journals that merit a separate mention.

Panel 1: Journal Websites

BMJ	http://www.bmj.com/bmj/index.html
Infectious Diseases in Children	http://www.slackinc.com/child/idc/idchome.htm
Journal of the American Medical Association	http://www.ama-assn.org/scipub.htm
Journal of Image Guided Surgery	http://www.interscience.wiley.com/cas
Medical Reporter	http://medical reporter.health.org/
Nature	http://www.nature.com/
New England Journal of Medicine	http://www.nejm.org/
New Scientist	http://www.newscientist.com/
Reviews on Cancer Online	http://www1.elsevier.nl/journals/roco/
Science	http://www.sciencemag.org/
Scientific American	http://www.sciam.com/

SEARCH ENGINES AND MEDICAL SITE LISTS

but a list of every useful site on the Internet related to medicine. For help on using search engines, see page s7.

Panel 2: Search Engines

Fast search engine (see Article)	http://www.google.com
Health on the net foundation	http://www/hon.ch/
Hotbot	http://www.looksmart.com/
InfoMedical.com search engine and directory	http://www.infomedical.com/nindex.htm
Infoseek health channel	http://www.infoseek.com/
Medexplorer: health medical Internet search engine	http://www.medexplorer.com/
Newsfile search icon	http://www.homepage.holowww.com/
Webcrawler	http://webcrawler.com/Health/
WWW virtual library:Biosciences:Medicine	http://vlib.stanford.edu/Overview.html

Forthciming Activities

1. Interns Orientation Programme (IOP-2000) for the Interns of JIPMER - January 2000 batch - February 2-4, 2000.

2. 42nd National Course on Educational Science for Teachers of Health Professionals at JIPMER - From 21st February to 2nd March,2000.

3. Training of Trainers Workshop for IPP-VIII Project, Hyderabad - scheduled to be held in March 2000.
4. Training of Trainers Workshop on Rational Drug Use and Essential Drugs Programme for Kerala State - scheduled to be held in March 2000.

Letters

Sir,

Self Learning Packages/Modules in Pharmacology

This innovative teaching-learning method aims to impart core skills like inter-pretive skills, intellectual skills (application type) and communication skills related to medication advice to MBBS students in Pharmacology. The students take these packages after gaining pre-requisite knowledge during theory classes. The self-learning modules may contain one of these exercises: Patient related problem solving exercise, problem solving flow chart, kinetic graph, exercise on dose calculation, exercise on prescription writing, criticise, correct and rewrite (CCR) of prescription, medication advice regarding the choice of therapy, ADR, prognosis and outcome.

Each student goes through the study material in each package and answers the study questions given at the end of each exercise. The key to the questions are given separately. (Each exercise with questions and key are typed on index cards and kept in a small box/ cover as study materials.) Each student can score the answers with the help of the key to get instant corrective feedback. He seeks the help of the teacher only when needed. This can also be used as a kind of self-assessment. The advantages are:

(1) It develops problem solving ability, and

(2) It promotes self-confidence and independence to relate what they learn to what they do in future.

Dr. Reneega Gangadhar
Assoc Prof of Pharmacology
Medical College, Trivandrum.

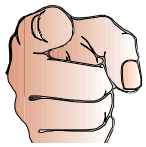
Sir,

Short Courses on Educational Science and Technology

Two Short Courses on Educational Science and Technology for the NTR University of Health Sciences, Andhra Pradesh, will be conducted as below:

1st course: December 21-23, 1999 at Kurnool Medical College, Kurnool.
2nd course: December 27-29, 1999 at Andhra Medical College, Visakhapatnam.

Dr. G.M. Krishna Rao
Coordinator, MEU
Kurnool Medical College, A.P.



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