

EDUCATION IN 2010

FUNDAMENTAL CONCEPTS

- Throughout this scenario, the terms *network*, *Internet*, *internet-accessible*, *online*, etc. are used interchangeably in describing an environment in which people have access to information stored on computers, without regard to time & place. This access might take place through the Internet or an Intranet or a wireless connection device or the telephone. Where appropriate, access privileges are provided for protected resources.
- From your computer, wherever it is, you can find the materials you need for the educational activity in which you are involved. This capability helps to move education out of discrete boxes (college, professional school, residency, etc.) and enable true lifelong learning.
- The right balance of in-person and computer mediated communication must be found. Education cannot be all 'virtual'. This balance will vary by the nature of the activity, i.e., with the balance in clinical training favoring face-to-face interaction while the study of biological processes is done primarily through simulations and computer-based tutorials.
- Health-professions students should be able to use the Internet to begin their training without leaving their home communities. The capability of computing & communication technologies to deliver high-quality learning experiences to a diverse audience is one of the most promising aspects of computer-mediated education.
- The phrase 'health professions schools' is used throughout to emphasize the important relationships among schools of medicine, nursing, pharmacy, dentistry and allied health professions that can be enhanced by creative application of network-based programs & resources.

THE DESIRABLE FUTURE

COMMUNICATION & ACCESS: Computer & audio/video linkages allow faculty to and students to interact at will when they are not geographically co-located. All curricular materials, for faculty & students, are accessible at the user's chosen workstation.

CURRICULUM: By mixing in-person teaching and self-guided use of computer based learning materials, health professions schools are able to expand the scope of their curricula to cover emergent topics and to build new bridges to curricula in other health professions schools. Appropriate emphasis on computer-mediated clinical care and information management is incorporated into required courses on communication, epidemiology, ethics, clinical research and clinical skills for all health-professions students. Many schools draw upon standardized clinical curriculum for each specialty & subspecialty; some are using a national core curriculum for basic biological and information sciences. Learning outcomes for students whose courses employ these standardized curricula are pooled in databases that are used for outcomes research and quality assessment by program administrators and accreditation agencies. Medical schools work with other health-professions schools to provide interdisciplinary training to their students, using computer-based curriculum materials and network-enhanced teamwork & group discussion. Teaching faculty work with media developers to modularize course content, updating and enriching it with simulations, learning aids, evaluation tools & information links to the Internet.

KNOWLEDGE, INFORMATION, DATA: Students learn from text sources that are continuously updated with best evidence. Computer-based instructional materials contain assessment components that continuously test students and alert their instructors to progress and problems. A distributed set of refereed digital learning resources created by instructional faculty, professional societies and others is accessible via the Internet through a master index or portal. Some materials are free, others require fees or licensing, depending on the policies of the owner. There are e-business mechanisms that monitor the purchase, use and accounting for use of these resources. New legislation on intellectual property rights has clarified ownership issues for Internet-based resources. All texts, class notes and other curriculum materials a student needs to complete a program are accessible through a single, well-organized entry point. These materials include tools students can use to personalize and organize the contents to suit themselves (i.e., 'my.medicalclerkship.edu', with markup, note

taking, indexing, etc.), creating a knowledge aid for reference throughout their professional lives. Outcomes 'report cards' for individual courses and medical schools are widely available on the Internet and used in application & accreditation decisions.

ORGANIZATION & OPERATIONS: Health professions schools use the Internet to improve communications with consumers and alumni. Many alumni choose to retain Internet-based benefits such as access to digital libraries, IT support, and tailored CME. Continued communication links between schools and their graduates enables long-term assessment of learning outcomes. Awards for the innovative application of information technology are highly-prized among teaching faculty. Instructional technology applications have value in promotion & tenure decisions.

PROCESSES & METHODS: Standardized patients and simulations are in widespread use for teaching, learning, evaluation, CME and certification. Online modules for personal continuing education are triggered by outcomes analysis of a care-giver's patients. All students practice invasive procedures (from injections to suturing to laparoscopic cholecystectomy) using clinical simulation software that certifies them when they are competent to perform procedures on living patients. Schools use preceptorships, small group sessions and other face-to-face experiences to enrich the required Internet-based curriculum by providing mentors and role models for students. Faculty are provided with the skills and knowledge they need to effectively deliver instruction and clinical care using IT.

ROLES: Students enrich the formal curriculum by choosing electives and special learning opportunities from any/all health professions programs. Libraries provide copyright clearance and management services for faculty publications. In some schools, librarians have primary responsibility for teaching and evaluating student information competencies. Health professions schools become involved in educating the public about health.

RISKS, CONCERNS & BLOCKING FACTORS

COMMUNICATION & ACCESS: The greatest risk is that people will go to extremes, replacing in-person communication with computer-mediated learning without putting sufficient thought into the appropriate medium for the task or message.

CURRICULUM: The chief risk is the constraints that will be placed on access to instructional materials if intellectual property laws are not updated to address distance learning and electronic publishing. Another risk is that the quality of education will suffer if learning materials emphasize technology or e-business concerns rather than the care of patients and improvement of health. A concern is that learning outcomes will be negatively affected in technology-enabled health professions education if sufficient attention is not paid to creating high-quality interpersonal learning experiences, and to the assessment of learning.

KNOWLEDGE, INFORMATION, DATA: The two greatest risks are: (1) commercialization of information, such that all useful information is proprietary and available only on a fee basis; and (2) widespread online publishing of un-reviewed, low-quality health information on the Internet will lead to new unaccredited medical education programs or lower the quality of education that is provided in accredited schools. A chief concern is that standardization of curricula will erode the unique cultures and special qualities of individual medical schools and lead to the production of a cadre of 'cookie cutter' health care providers.

ORGANIZATION & OPERATIONS: The chief blocking factor is the difficulty of reallocating space, time and expertise in order to move from the current model of education to a more continuous stream of self-directed and small-group learning & interaction that is not bounded by time or space. A related concern is that widespread availability of Internet-based learning options will lead to the closure of some schools, or to schools that concentrate on teaching only part of the full curriculum (i.e., basic sciences or clinical sciences but not both). A chief risk is that funding will not be available to support the renewal and improvement of technology-based resources.

PROCESSES & METHODS: The chief risk is that over-emphasis on self instruction and use of computer-based learning tools will result in a loss of the fundamental knowledge & skill gained through personal interaction with appropriate role models and mentors. The chief concern is that information infrastructure (people, networks, software, knowledge resources) needed to support the decentralized learning environment

(i.e., moving the primary site of instruction to the patient's home or commercial research lab or a student's home or workplace) will not be affordable. Use of published materials in courses could also be reduced due to high copyright costs.

ROLES: The chief risk is that teaching faculty will be unable to devote the time necessary for development of high quality instructional media without jeopardizing their research and service roles. This could lead to faculty positions that involve only 2 of the 3 traditional academic missions (i.e., teaching and research, or research and service). There is a need to incorporate new kinds of expertise (e.g., information science, behavioral science, business management) into educational programs, but no clear picture of the best way to do this. The absence of fair models of cost and revenue sharing for online learning resources will change the relationship among faculties, academic institutions and commercial ventures.