

Training the Health and Biomedical Informatics Workforce: Competencies and Approaches

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“Education is the most powerful weapon [that] you can use to change the world.”



Nelson Mandela



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Overview of talk

- A bright future for health information technology (HIT)
- The professional practice of biomedical informatics
- What we know and should know
- Towards an informatics profession
- Educational programs – curriculum and experiences



3

The picture is bright for HIT in the 21st century

- Recognition of its value, especially the electronic health record (EHR) with clinical decision support (CDS)
- Consensus of vision regarding health information exchange (HIE) embodied in the National Health Information Network (NHIN)
- Prominent role for informatics in the National Institutes of Health (NIH) Roadmap and translational research (CTSA) initiatives



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But there are impediments and challenges

- On the clinical side (Hersh, 2004)
 - Cost and financing
 - Synchronization with clinical workflow
 - Interoperability, standards, and terminology
 - Privacy and confidentiality
- On the research side (Crist, 2004)
 - Inadequate infrastructure
 - Lack of secondary reusability of data
- And for both
 - Developing a workforce of professionals and users



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Existing competencies in informatics

- IMIA Working Group on Education (MIM, 2000)
- ACMI – aimed more at researchers (Friedman, 2004)
- UK NHS Information Authority (Christie, 2003)
- Clinical specialties
 - Medical students – AAMC, 1999
 - Nurses – Stagers, 2002
 - Nurse practitioners – Curran, 2003
 - Public Health – O’Carroll, 2002



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Categories of biomedical informatics practice

Category	Jobs
Academic	Informatics researcher or teacher
Professional	CIO, Chief Medical/Nursing Information Officer, Developer, Trainer
Liaison	Represent clinical or research community in IT initiatives

- Adapted from Covvey et al., *Pointing the Way*, 2001
- Elaborated in Hersh, *JAMIA*, Mar/Apr 2006
 - "Liaison" a better word than "expert"
- The demarcations are admittedly blurry

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Medical informaticians are just part of the larger HIT workforce

- Other professionals in health care IT include
 - Health information management (HIM) professionals
 - IT professionals, often with computer science (CS) or management information systems (MIS) backgrounds
 - Health science librarians
 - Clinicians who gravitate into IT roles with or without formal training

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What do we know about the HIT workforce?

- General IT staff (Gabler, 2003)
 - Assessed 85 integrated delivery systems of varying size
 - Employ about one IT staff per 56 non-IT employees
 - Roles: programmer/analyst (51%), support (28%), telecomm (16%)
- Health information management (Wing, 2003)
 - Historic role of medical records departments changing
 - Projected by Bureau of Labor Statistics for 49% growth by 2010 (Hecker, 2001)

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Do we know anything about informaticians?

- Hoffman and Ash (2001)
 - Survey of potential employers of informatics graduates
 - Most important skills desired included
 - Knowledge of clinical information
 - Interpersonal skills
 - Change management
 - Relational databases
 - Project management
- Knaup et al. (2003)
 - Survey of first 1024 University of Heidelberg and Heilbronn graduates
 - Most important topics of study included
 - Database and information systems
 - Software development/engineering
 - Economics
 - Information systems in health care

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Do we know anything about informatics leaders?

- AMDIS survey (Conn, 2003)
 - 82 AMDIS members
 - Little formal training in informatics
 - Value managerial and clinical over technical skills
- Analysis of five Chief Medical Information Officers (CMIOs) Leviss (2006)
 - Leadership, communication, and consensus-building among most important skills
 - Part of senior physician executive team
 - Do not want to be seen as just "techie" doctors

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Questions we need to answer (Hersh, 2006)

- What, if anything, distinguishes medical informatics from other areas of HIT?
- If there is a difference, where does HIT end and informatics begin?
- What jobs or roles within HIT that require formal training in medical informatics?
- What is optimal organization of the workforce within organizations to best achieve the value of HIT?
- What is the best training for the various individuals who assume those roles in the workforce?
- How can professionalization of this workforce improve implementation of HIT?

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Is medical informatics a “profession?”

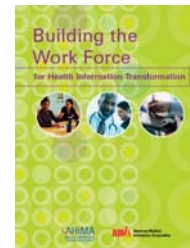
- According to SWEBOK (www.swebok.org), a profession is characterized by
 - An initial professional education in a curriculum validated through accreditation
 - Registration of fitness to practice via voluntary certification or mandatory licensing
 - Specialized skill development and continuing professional education
 - Communal support via a professional society
 - A commitment to norms of conduct often prescribed in a code of ethics
- Also assessed by Joyub (2004)
- By these definitions, medical informatics is not (yet) a profession

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Some answers are emerging

- Summit in Nov., 2005 to address issues of building workforce
- Report published in 2006
- Based on premise that HIT benefits will not accrue without well-trained workforce to implement systems



http://www.ahima.org/emerging_issues/Workforce_web.pdf

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Major recommendations from workforce report

- Adopt IOM “Quality Chasm” vision
- Create incentives to adopt “systems” that promote quality through use of HIT
- Establish industry-wide advocacy for workforce training and development
- Build awareness of need for workforce development
- Utilize innovative learning environments to train workforce
- Develop formal educational programs and promote their value
- Disseminate tools and best practices for these new professionals to succeed

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Categories of informatics education

Category	Typical Programs
Academic	- PhD - Postdoc ± master’s degree
Professional	- Postdoc ± master’s degree - Master’s Degree - Graduate Certificate
Liaison	- 10x10

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Education and training in the United States

- Since a highly multi-disciplinary field, no standard curriculum or accreditation
 - Listing of programs on Web site of American Medical Informatics Association (www.amia.org)
 - Description of OHSU program to follow as an example; consult other programs’ Web sites for details on their programs
- Education has historically focused on academics but is evolving to meet the needs of practitioners and users

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Biomedical informatics education at OHSU

- Academic
 - Predoc/Postdoc Fellowship funded by NLM and VA
 - PhD in Biomedical Informatics degree
 - Master of Science in Biomedical Informatics degree for postdocs from other fields
- Professional
 - Master of Science and Master of Biomedical Informatics degrees
 - Graduate Certificate Program (distance learning)
- Liaison
 - OHSU-AMIA 10x10 program

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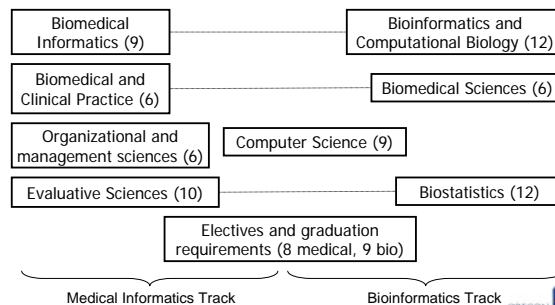
Informatics curriculum at OHSU – general principles

- Aims to cover the “full spectrum” of biomedical informatics (Hersh, 2005)
- Curriculum centered around “knowledge base”
 - Core knowledge at master’s level
 - PhD adds advanced courses and research
 - “Building block” approach allows progression to higher levels
- Have established two “tracks”
 - Medical informatics
 - Bioinformatics
 - Could establish others: public health informatics, health information management

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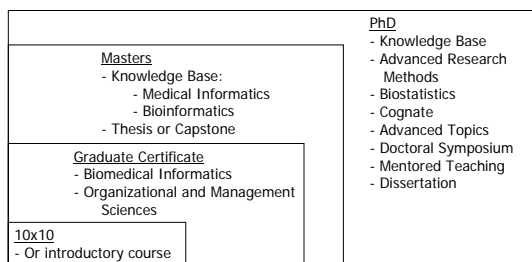
“Knowledge base” and its “domains”



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Building blocks of curriculum



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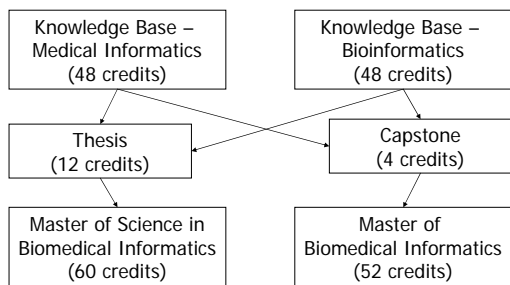
Application of curriculum to specific programs

- 10x10 covers introductory course for other programs
- Graduate Certificate program focuses mainly on first two areas
 - Biomedical informatics
 - Organizational and management sciences
- Master’s programs add full knowledge base plus either
 - Thesis – Master of Science
 - Capstone – Master of Biomedical Informatics
- PhD program adds specialized research training, cognate area of interest, doctoral seminar, and dissertation

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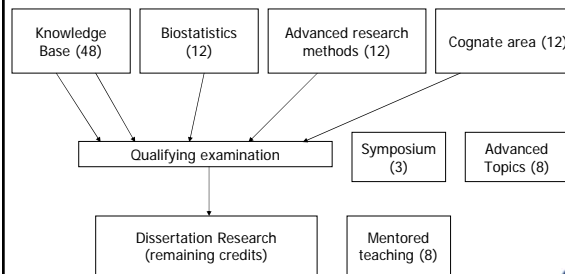
Master’s curricula



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PhD curriculum



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Educating the liaisons – 10x10

- Partnership with American Medical Informatics Association (AMIA) to meet Charles Safran's goal of educating one physician and one nurse from each US hospital in informatics
 - Or, put another way, aim to educate 10,000 health care providers by 2010
- Course consists of introductory on-line course and adding one-day face-to-face session
 - Other partners are also offering courses



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Topics of OHSU 10x10 course

- Overview of Discipline and Its History
- Biomedical Computing
- Electronic Health Records and Health Information Exchange
- Decision Support and Health Care Quality
- Standards, Privacy and Security, Costs and Implementation
- Evidence-Based Medicine and Medical Decision-Making
- Information Retrieval and Digital Libraries
- Bioinformatics
- Imaging Informatics and Telemedicine
- Other Informatics: Consumer Health, Public Health, and Nursing
- Organization and Management Issues in Informatics

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Educating beyond our site – distance learning

- (Hersh, JAMIA, 2001)
- Initially in Graduate Certificate, now master's
- Teaching modalities include
 - Voice-over-Powerpoint lectures
 - Threaded discussions
 - Readings, virtual projects, etc.
- Courses are not correspondence courses; interaction is a core component
- Have created a virtual community
 - Meet at AMIA, HIMSS, OHSU, etc.

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How have OHSU informatics students done?

- General observation: What people do when they graduate often depends on what they did when they entered, e.g.,
 - Physicians, nurses, and other clinicians draw on their clinical background
 - Biomedical researchers draw on their unique background and experience
- Graduates have obtained jobs in a variety of settings, e.g., clinical, academic, and industry
- Some have obtained jobs before finishing the program; a few before starting

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Conclusions

- Probably the most important factor for the success of HIT will be the competencies of those who use and implement it
- A skilled and knowledgeable workforce must emerge to implement HIT most effectively
- There are challenges and opportunities for those of us who are passionate about leading the way

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For more information

- Bill Hersh
 - <http://www.billhersh.info>
- OHSU Department of Medical Informatics & Clinical Epidemiology
 - <http://www.ohsu.edu/dmice>
- OHSU educational programs
 - <http://www.ohsu.edu/dmice/education>
- American Medical Informatics Association
 - <http://www.amia.org>
- AMIA 10x10
 - <http://www.amia.org/10x10>

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