

Training the Health and Biomedical Informatics Workforce: Competencies and Approaches

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References

- Anonymous (1999). Medical School Objectives Project: Medical Informatics Objectives. Washington, DC, Association of American Medical Colleges.
<http://www.aamc.org/meded/msop/start.htm>.
- Anonymous (2000). Recommendations of the International Medical Informatics Association (IMIA) on education in health and medical informatics. *Methods of Information in Medicine*, 39: 267-277.
- Anonymous (2006). Building the Work Force for Health Information Transformation. Chicago, IL and Bethesda, MD, American Health Information Management Association and American Medical Informatics Association.
http://www.ahima.org/emerging_issues/Workforce_web.pdf.
- Christie, M. (2003). Project to Develop National Occupational Standards for Health Informatics. London, UK, NHS Information Authority.
http://www.nhsia.nhs.uk/nhid/pages/histandards/hinos/occupational_map.pdf.
- Conn, J. (2003). In IT, it pays to think big - survey puts metrics to medical informatics. *Modern Physician*. 18-19.
- Covvey, H., Zitner, D. and Bernstein, R. (2001). Pointing the Way: Competencies and Curricula in Health Informatics. Waterloo, Ontario, Canada, University of Waterloo.
http://www.cs.uwaterloo.ca/health_info/health_docs/CurriculaMASTERDocumentVersion1Final.zip.
- Crist, T., Barr, W., Linas, S. and Zuckerman, K. (2004). Using local solutions to address a national issue: ASP's recommendations to ensure the vitality of clinical research. *American Journal of Medicine*, 116: 359-362.
- Curran, C. (2003). Informatics competencies for nurse practitioners. *AACN Clinical Issues*, 14: 320-330.
- Friedman, C., Altman, R., Kohane, I., McCormick, K., Miller, P., Ozbolt, J., Shortliffe, E., Stormo, G., Szczepaniak, M., Tuck, D. and Williamson, J. (2004). Training the next generation of informaticians: the impact of 'BISTI' and bioinformatics; a report from the American College of Medical Informatics. *Journal of the American Medical Informatics Association*, 11: 167-172.
- Gabler, J. (2003). 2003 Integrated Delivery System IT Budget and Staffing Study Results. Stamford, CT, Gartner Corp.

- Hecker, D. (2001). Occupational employment projections to 2010. *Monthly Labor Review*, 124: 57-84.
- Hersh, W. (2004). Health care information technology: progress and barriers. *Journal of the American Medical Association*, 292: 2273-2274.
- Hersh, W. (2005). *The Full Spectrum of Biomedical Informatics Research and Education at OHSU*, 204-209, in Haux, R. and Kulikowski, C., eds. *Yearbook of Medical Informatics 2005*. Stuttgart, Germany. Schattauer.
- Hersh, W. (2006). Who are the informaticians? What we know and should know. *Journal of the American Medical Informatics Association*, 13: 166-170.
- Hersh, W. (2007). The full spectrum of biomedical informatics education at Oregon Health & Science University. *Methods of Information in Medicine*: in press.
- Hersh, W., Junium, K., Mailhot, M. and Tidmarsh, P. (2001). Implementation and evaluation of a medical informatics distance education program. *Journal of the American Medical Informatics Association*, 8: 570-584.
- Hoffmann, S. and Ash, J. (2001). A survey of academic and industry professionals regarding the preferred skillset of graduates of medical informatics programs. *MEDINFO 2001 - Proceedings of the Tenth World Congress on Medical Informatics*, London, England. IOS Press. 1028-1032.
- Joyub, R. (2004). The Professionalisation of Health Informatics in the United Kingdom. UK Health Informatics Today. Spring, 2004. 1-2, 4.
- Knaup, P., Frey, W., Haux, R. and Leven, F. (2003). Medical informatics specialists: what are their job profiles? Results of a study on the first 1024 medical informatics graduates of the Universities of Heidelberg and Heilbronn. *Methods of Information in Medicine*, 42: 578-587.
- Leviss, J., Kremsdorf, R. and Mohaideen, M. (2006). The CMIO - a new leader for health systems. *Journal of the American Medical Informatics Association*, 13: 573-578.
- Monegain, B. (2004). Healthcare IT: is it a breed apart? *Healthcare IT News*. September, 2004. 4.
- O'Carroll, P. (2002). Informatics Competencies for Public Health Professionals. Seattle, WA, Northwest Center for Public Health Practice.
http://healthlinks.washington.edu/nwcphp/phi/comps/phi_print.pdf.
- Staggers, N., Gassert, C. and Curran, C. (2002). A Delphi study to determine informatics competencies at four levels of practice. *Nursing Research*, 51: 383-390.
- Wing, P., Langelier, M., Continelli, T. and Armstrong, D. (2003). Data for Decisions: the HIM Workforce and Workplace - 2002 Member Survey. Chicago, IL, American Health Information Management Association.
http://library.ahima.org/xpedio/groups/public/documents/ahima/bok1_018947.pdf.

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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



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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 care CIOs (Monegain, 2004)
 - Survey of 91 found 88% in agreement that understanding of health care environment is essential to IT practice in health care settings
- 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?”

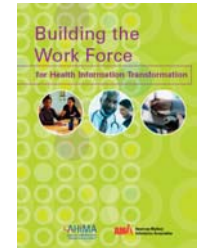
- According to SWEBOK (www.swebok.org), a profession is characterized by
 - An initial professional education in a curriculum validated through accreditation
 - Registration of fitness to practice via voluntary certification or mandatory licensing
 - Specialized skill development and continuing professional 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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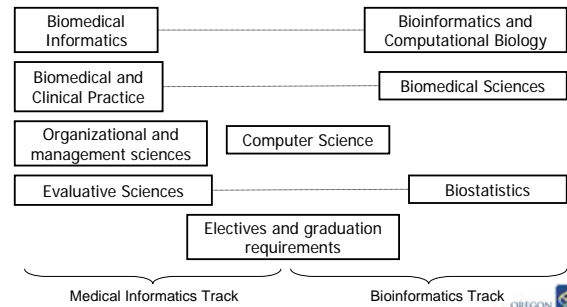
Informatics curriculum at OHSU – general principles

- Aims to cover the “full spectrum” of biomedical informatics (Hersh, 2005; Hersh, 2007)
- 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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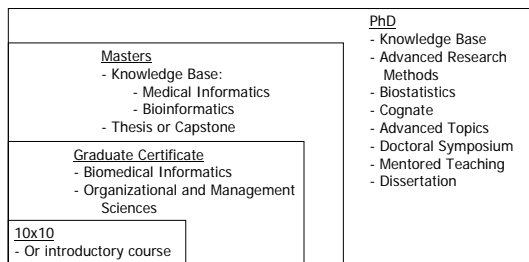
“Knowledge base” and its “domains”



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Building blocks of curriculum



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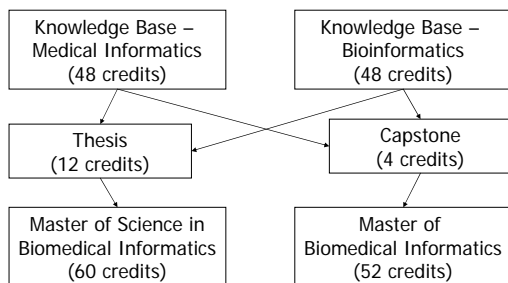
Application of curriculum to specific programs

- 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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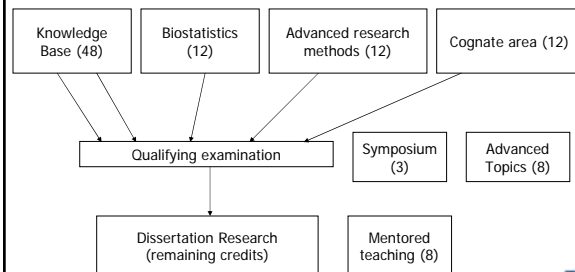
Master’s curricula



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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

AMIA 10x10™
10,000 Trained by 2010



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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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New models for education can be developed with this technology

- Translation of 10x10 course into Spanish for Latin American audience
- Offered in partnership with *Hospital Italiano* of Buenos Aires, Argentina
- Over 150 participants from 10 countries have completed course so far



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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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Current and future directions

- Expansion of 10x10 – new partners, e.g.,
 - American College of Physicians
 - Scottsdale Institute
 - Mayo Clinic
- Development of health information management (HIM) track
 - Including RHIA certification
- Recent renewal of NLM training grant



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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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