Breakout Session 3: The Educational Pipeline for Healthcare IT

Moderated by David Kotz, Champion International Professor of Computer Science, Dartmouth

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The focus of this breakout session was to discuss novel educational methods to prepare both medical and informatics engineering students to pursue emerging opportunities in the multi-disciplinary Healthcare IT industry.

Broadly, the following topics were covered in this session.

Workforce requirements of Healthcare IT

The session opened with an anecdotal reference to an exchange that Kevin Fu, Associate Professor, University of Massachusetts, Amherst, had with an unnamed medical device manufacturer regarding technical choices that they had made: “Why are you using C# in medical sensor platforms?”, he asked them (implying that they should consider more-secure languages). “Because we can’t find students with the right skills.”

A general consensus followed that modern medical informatics companies could not hire the ideal workforce that did not exist – one that could reasonably deal with both clinical and technical challenges of the day. Clinicians need more informatics training. Technology & engineering students need training in clinical practice, so manufacturers can hire students who understand development for safety-critical products.

Undergraduate education and training requires a more holistic view.

Joshua Lee, Health Sciences Associate Professor of Medicine, UC San Diego, noted that it is important to meet with Health IT industry leaders to understand workforce requirements of the day. Current multi-disciplinary courses such as Medical Informatics may not produce professionals with enough systems programming know-how to fulfill new roles successfully.

Lisa Marsch, Dartmouth Psychiatric Research Center, who consulted a team comprised of people from different backgrounds such as technical engineers, medical clinicians, health ethics, and law, noted that a focused goal could produce better results. Prof. Kotz noted in response that sufficient common language must exist for this model to work.

Kevin Fu also noted that graduate education lacks focus on system quality assessment, validation and verification.

How could universities help students of Computer Science prepare for multi-disciplinary roles in the Healthcare IT sector?

1. Courses

Strong fundamental knowledge of Computer Science is required

Amar Das (Director, Center for Biomedical Informatics and Associate Professor of Psychiatry and of The Dartmouth Institute of Health Policy and Clinical Practice) said
that teams consisting of people from diverse backgrounds tend to perform better. Saying that computational background was essential in understanding applied and advanced topics, he noted how a Bio-informatics programming course had evolved into a Systems Programming course to ensure that students were well versed in the principles of system design before presenting them with current applications. [The course is the Principles of Systems Design, at Stanford.] He stressed that undergraduates with early exposure to current topics were likely to perform better and choose advanced courses in their area of interest. Brad Malin (Associate Professor of Biomedical informatics & CS, Vanderbilt University) noted the following regarding multi-disciplinary courses he encountered:

- They require general knowledge in physics
- Were too specialized to be useful (such as Medical Device Safety/Security Course)
- Often can’t be built upon in other courses
- It would be better to introduce students to the basic principles, to avoid pigeonholing students into specializations

CS + X courses

Carl Gunter (Professor, University of Illinois at Urbana Champaign) also mentioned that UIUC offers several “CS+X” degree tracks for undergraduate students. He also pondered whether medical schools found it particularly challenging to engage in inter-disciplinary education due to accreditation sensitivity.

These programs can be challenging to design, because it is difficult to fit more material into a fixed-size curriculum, outside the ‘core’ of a field.

Active involvement of different departments

Brad Malin noted some problems:
- Medical schools on campuses were typically physically separate from undergraduate school, thus limiting ‘down-the-hall’ availability of faculty.
- Since medical school faculty is not paid to teach, they have fewer incentives to work with students from other departments.

Online courses

In order to address instructional gaps due to lack of incentives, Carl Gunter suggested that online courses with a video series followed by Q&A would be helpful.

In most medical/health informatics programs, most incoming students come from either a CS or a science background, but rarely both. Best students would have strong science background as well as strong CS, with some exposure to clinical needs.
2. Internships in Health IT

Brad Malin observed from his experience teaching multi-disciplinary courses, that it was difficult to do Health & IT when we separate it from mainstream education. He also brought focus to another hurdle in educating biomedical informatics students: lack of practical training (internship) opportunities available in the field as well as lack of requirement of practical training imposed by the curricula (unlike Computer Science programs). While acknowledging that internships were not critical, he asserted that they would “help students immensely”.

Conversely, it is important for CS/engineering students to get into healthcare settings, for a dose of reality, exposure to clinical workflow, etc. Andrew Gettinger (Professor & Associate Dean for Clinical Informatics at Dartmouth’s Geisel School of Medicine) noted that this is not so easy to do; there are lots of regulatory issues in bringing non-medical students into a clinical setting.

Job vs. career prospects – Getting students excited about new and emerging fields in Computing

- Brad Malin noted that Biomedical informatics courses alone could not produce Biomedical device programmers. To make this a viable career prospect, NIH ought to support supplemental training programs.
- Tanzeem Choudhury (Professor, Cornell University) broached the issue of the lack of women in computing and noted that more women preferred medical discipline as the field provided a more forceful, tangible impact.
- Ease of transition: The number one problem of students coming into grad school programs is that they are specialized in biology/chemistry or computer science. It would be great if students were already up to speed and versed in both of these areas; well rounded.

What should we be doing on the clinical training side to ensure that they are equipped to deal with basic IT?

The latter half of the discussion focused on creating a multi-disciplinary clinical education pipeline.

Joshua Lee noted the following:
- EHRs must be introduced during patient engagement.
- At DMS (Dartmouth Medical School, now Geisel School of Medicine), clinical preceptors taught students to use technology tools, helping the faculty keep up with the technology themselves. See it, do it, teach it.
- Create a residency with an extra year in systems-based care or medical informatics
How do we enable medical students with an already full MD curriculum to engage in cross-disciplinary training?

Brad Malin suggested that medical students could get involved in Informatics projects, even with limited CS knowledge, on a rotation basis to understand systems practices.

Dr. Andrew Gettinger concluded with:

- Geisel’s MD program includes a privacy session as part of the program orientation. There is plenty of room to improve teaching privacy, such as creating undergraduate freshman seminars about healthcare IT, security & privacy issues and offering additional courses within the Computer Science department focused on providing systems training to medical students.

- However, he suspected that the current model of optional electives for MD students, such as those on IT/security issues, does not work because medical students could not handle the extra workload (“compressed time” factor).