

## Health informatics training at the postgraduate level: a curriculum development exercise in Pakistan

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### Abstract

To assist in developing a curriculum for health informatics training at COMSATS Institute of Information Technology in Islamabad, Pakistan, existing postgraduate-level health informatics curricula at universities in the United Kingdom and New Zealand were reviewed. In all cases, curricula consisted of both health science and computer science courses, with those pertaining to health sciences comprising the greater proportion. The review also disclosed variations in the training programmes offered by the different institutions. It is argued that identifying a standard set of competencies which health informaticians should possess would lead to the emergence of an agreed set of core courses required for the discipline, thereby reducing variations in training programmes and better equipping graduates for their future roles.

*Keywords: health informatics, curriculum, Pakistan, South Asia, developing countries*

### Introduction

Health informatics is a new and developing field for which a globally accepted definition has yet to emerge. As a result, agreement on its scope and the curricula of training programmes can become matters of debate—as was the case when the first postgraduate training programme in health informatics to be offered in Pakistan was established at COMSATS Institute of Information Technology (CIIT), Islamabad in 2007. To clarify the focus of the courses to be included in the programme, the main issue under discussion was whether health informatics should be considered primarily a field of computer sciences or of health sciences.

Health informatics is a combination of both health information systems and communication systems, and information and communication technology (ICT), albeit important, is basically the tool (Coiera, 2003). The analogy is made that “health informatics is as much about computers as cardiology is about stethoscopes” (Coiera, 2003, p.xxi). By this token, the focus of health informatics lies in health systems and the handling, organisation and management of knowledge (Coiera 2003; Whetton, 2005). While recognizing the validity of this description, it was felt there was need for more evidence on what specific knowledge and skills their health informatics training programme should address.

It was therefore decided to review actual curricula of health informatics programmes already offered by other institutions. Because of the need to complete the review in a relatively short time frame, it was decided to restrict the review to the UK and New Zealand, two countries with which the author had

some familiarity. Though not global in scope, it was felt such a review would provide useful guidance for development of the CIIT curriculum. Again due to time constraints, the review was limited to information readily available on the Internet.

### Methods

The Internet was initially searched for all UK and New Zealand universities offering health informatics programmes. The selection was then narrowed to include only those institutions whose websites provided a sufficient amount of curricular information on their programmes. **Table 1** lists the twelve universities selected for the review, which was carried out in July 2007.

A data extraction table was used to review the twelve health informatics curricula obtained. The information extracted and reviewed was:

1. The level(s) at which the programme was offered;
2. The department that housed the programme;
3. Eligible disciplines of students;
4. Courses included in the programme.

From the information obtained in relation to point 4, courses were grouped into two categories—health sciences or computer sciences. For the purposes of this review, ‘health sciences’ was defined broadly and taken to include courses pertaining to health systems, health data, research and evaluation, clinical decision-making, health policy, and management in health.

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**Table 1**  
Universities included in the review

Country	University
United Kingdom	University of Aberdeen
	University of Bath
	University of Central Lancashire
	City University
	Coventry University
	University of Salford
	University of Sheffield
	Swansea University
	University College London
New Zealand	University of the West of England
	University of Auckland
	University of Otago

under health sciences; in seven universities, the proportion was 80% or more. Courses offered in health sciences included (among others): health data, research and evaluation, management, information analysis, clinical decision-making, evidence-based medicine and electronic health records. Computer science courses offered mainly covered basic introductions to hardware, software, networking, and databases. Only a few universities offered more advanced computer science related courses.

## Outcome

To develop a comprehensive health informatics curriculum for its masters degree at CIIT, curricula of the universities reviewed were combined through a process that ensured all main areas were covered. While CIIT's curriculum has yet to be finalised and approved by the Board of Studies, and might therefore still undergo modifications, the curriculum outline derived from the review is given in **Table 2**.

## Results

1. All twelve universities had a masters degree programme and five also offered a postgraduate diploma, confirming that the curricula reviewed were relevant to CIIT's postgraduate-level training programme.
2. Two of the universities had dedicated health informatics departments. Among the others, three housed their programme in health science departments, two in information science, one in business and law, and one in computer science.
3. In all cases, programmes were open to students with either health or ICT backgrounds.
4. All health informatics curricula reviewed offered courses relating to both health sciences and computer science. On average, 78% of all courses at the twelve universities were categorized

## Discussion and Conclusion

To assess the comprehensiveness of the derived curriculum outline, a comparison was made with two national health informatics training guidelines: Health Informatics Capability Development In New Zealand (Kerr et al., 2007) and the Australia Health Informatics Educational Framework developed by Garde and Hovenga (2006). The comparison confirmed that CIIT's curriculum was comprehensive and covered all key areas identified in the guidelines.

The review demonstrated that health informatics programmes in the twelve universities examined were considerably weighted in favour of courses in the health sciences as compared to computer science. This finding was in line with the endorsed set of recommendations of the International Medical Informatics Association (2000) on education in health and medical informatics, which suggests that out of a recommended total of 60 credits, 15 (25%) should be dedicated to the computer science related "knowledge/skill area" and 40 (67%) to the processing of data, information and knowledge in medicine and healthcare. For a dedicated health informatics masters programme, Garde and Hovenga (2006) suggest that out of a recommended total of 120 credits, 35 (29%) should be from computer science courses and the remaining 85 (71%) should be divided among the following categories: specific health informatics, people and organisational, clinical, and various. By comparison, the CIIT programme awards 27% of its credits for computer science courses and 73% for those related to health sciences, which is broadly in agreement with the recommendations noted above.

Placing greater emphasis on health sciences does not imply computer science subjects are less important—they are in fact indispensable and should be included as a core part of the training. However, the relative weightings inform us on the knowledge and skills balance required of health informaticians, and accordingly what this balance should be in training curricula.

**Table 2**  
Health Informatics curriculum outline for CIIT

<b>Semester 1 courses</b>
Information and communication technology for health informatics
Health application development
Electronic health records
<b>Semester 2 courses</b>
Research methods and statistics in health
Healthcare information systems
Software engineering
<b>Semester 3 courses</b>
Health data manipulation analysis
Standards in health informatics
<b>Semester 4 courses</b>
Geographic information systems
Management in health informatics
Medical Imaging

\*All courses in the table were selected by CIIT as compulsory courses.

\*\*Evidence-based medicine, consumer health informatics, and mobile technology in health informatics also emerged from the review as important, but were excluded from the CIIT curriculum, at least for the time being, given the current needs and limitations of Pakistan as a developing country.

An important deficiency observed through the review was that, with the exception of 'research and evaluation,' no set of core courses common to all the programmes could be identified. The consequent variations in the scope of the courses offered must inevitably give rise to differences in the specific knowledge and skills competencies that students obtain during their education. In order to ensure that there is a basic commonality to health informatics training that meets the requirements of the profession, it would be desirable if an agreed set of health informatics competencies could first be identified by monitoring bodies and institutions involved in the field, followed by the development of a concurrent set of core courses that health informatics training should cover. This approach would better equip students for the profession by improving the relevance of health informatics training to the roles and responsibilities they will be expected to undertake.

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