

# Health Informatics and E-health Curriculum for Clinical Health Profession Degrees

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**Abstract.** The project reported in this paper models a new approach to making health informatics and e-health education widely available to students in a range of Australian clinical health profession degrees. The development of a Masters level subject uses design-based research to apply educational quality assurance practices which are consistent with university qualification frameworks, and with clinical health profession education standards; at the same time it gives recognition to health informatics as a specialised profession in its own right. The paper presents details of (a) design with reference to the Australian Qualifications Framework and CHIA competencies, (b) peer review within a three-university teaching team, (c) external review by experts from the professions, (d) cross-institutional interprofessional online learning, (e) methods for evaluating student learning experiences and outcomes, and (f) mechanisms for making the curriculum openly available to interested parties. The project has sought and found demand among clinical health professionals for formal health informatics and e-health education that is designed for them. It has helped the educators and organisations involved to understand the need for nuanced and complementary health informatics educational offerings in Australian universities. These insights may aid in further efforts to address substantive and systemic challenges that clinical informatics faces in Australia.

**Keywords.** Clinical informatics, clinical workforce, competencies, design-based research, e-health education, health informatics education, interprofessional education, online learning, quality assurance

## Introduction

The rise of e-health around the world calls for new health informatics knowledge and skills in the clinical workforce. [1] In Australia as elsewhere 'health informatics' is the preferred term for the foundation discipline area and 'e-health' for the internet application area. [2] These terms are in common usage across a range of clinical professional practitioners who work directly with patients and clients. [3] Educational

planning and curriculum frameworks for this area of education in the clinical health professions have received attention nationally and internationally for over a decade. [4], [5]

The status of health informatics and e-health education in Australian clinical health profession degrees (i.e. specifically excluding non-clinical degrees such as business, engineering, information technology, life sciences) was the focus of baseline research from 2010-2013. [6] That research identified several localised and laudable curriculum initiatives, however it found that they were largely unknown beyond their home university so the majority of future clinicians in Australia did not benefit. Very few clinical degree programs had a systematic approach to teach, assess, evaluate or audit this aspect of professional education. Research and scholarship in this area were inactive compared to other areas of health professions education.

That study also identified systemic problems for the advancement of health informatics and e-health education: Learning, teaching and assessment resources that were up-to-date and appropriate for the Australian health system were scarce. Lecturers, tutors and placement supervisors lacked knowledge and experience to teach in this area. Graduate recruitment by healthcare organisations did not recognise this as a distinct area of expertise. Although some movement was evident (e.g. [7]), standards for accrediting degrees (e.g. [8]) and certifying practitioners (e.g. [9]) overall did not specify health informatics and e-health competencies.

The challenge of advancing health informatics and e-health education at scale in clinical health profession degrees in Australia cannot be satisfactorily addressed by individuals in separate institutions offering bespoke subjects at a local level. From the perspective of regulating the clinical professions, that approach is outside the governance processes for education in the clinical health professions. From the perspective of recognising the discipline and profession of health informatics, that approach does not map onto national or international recommendations for health informatics curriculum and competencies in any transparent or accountable way.

The aim of this paper is to report on a 2014-2015 clinical informatics and e-health subject (i.e. a unit of study) development project that models a new approach. This project's objective is to address the challenge of providing education that is widely available to students in a range of clinical profession degrees nationally. Additionally, this project introduces educational quality assurance practices which are consistent with university qualification frameworks, and with clinical health profession education standards, while at the same time it gives due recognition of health informatics as a specialised profession in its own right.

## 1. Methods

This project can be understood as educational research in terms of a design-based research methodology: It is characterised by being situated in a real educational context; focusing on the design and testing of a significant intervention; involving multiple iterations; contributing to the evolution of design principles; and having an impact on practice. [10]

The project has used mixed methods. The key methods used to address quality assurance are: (a) design with reference to university qualification levels and health informatics competency standards, (b) peer review within a multi-university teaching team, and (c) external review by experts from the professions. The key methods to

address the challenge of national availability are: (d) offering an online learning option that allows cross-institutional and interprofessional enrolment, (e) evaluating student learning experiences and outcomes, and (f) making the curriculum openly available to interested parties. This paper reports results of subject development quality assurance methods and foreshadows results regarding availability, in the next section.

## **2. Results**

The subject was designed to be offered at postgraduate level, or Australia Qualifications Framework level 8. [8] At this level the Australian university system offers a range of entry-level Masters degrees in the clinical professions as well as specialist certificates, diplomas and degrees. The subject directly responded to the creation - in the final year of the national baseline study - of a new set of 52 competencies in six domains for the certification of professional health informaticians in Australasia (CHIA). [11] The curriculum was further informed by pre-existing published recommendations (e.g. those developed by the Australian Health Informatics Education Council [12], the International Medical Informatics Association [13], and others itemised in [14]) that had been mapped in the development of CHIA [15]. The subject adapted these competencies for offering over a 12-week semester as follows: Orientation week; Health and Biomedical Sciences (over 2 weeks); Information and Communications Technology; Information Sciences; Management Sciences; Core Principles and Methods (over 4 weeks); Human and the Social Context; Review week.

The team to develop and teach the subject was a joint initiative by three universities in three States; individual team members also had a history of collaboration in the educational activities of relevant professional organisations (e.g., Australasian College of Health Informatics, Australasian Telehealth Society, Health Informatics Society of Australia, Health Information Management Association of Australia). This team drew together three of the academics who had conducted the 2010 national study plus an additional academic with a strong track record as a health informatics educator. A research assistant was recruited who had characteristics similar to the target student group - a recent graduate of a postgraduate clinical degree, with an interest in information and communication technology in healthcare. The lead academic created an integrated learning design for the subject; each academic took responsibility for developing curriculum related to CHIA competencies that aligned with their greatest expertise; the research assistant managed the project so that all team members planned, reviewed and critiqued the first iteration of the curriculum and learning design as a whole.

A panel of experts to review the curriculum was invited from the CHIA Board and also from others who expressed an interest in this project or the original study, including health informatics and e-health experts as well as academic coordinators of clinical degrees and subjects. Their brief was to provide feedback via a confidential online survey, on our interpretation of the CHIA competencies, our designated learning activities and our selection of learning resources. Feedback was received from 20 reviewers: approximately one-fifth were from the CHIA Board, nearly two-thirds were academic coordinators of clinical education, and over four-fifths had previous experience developing health informatics or e-health curriculum. The feedback was positive overall, and indicated that the curriculum was relevant to the clinical professions, was well-aligned with the CHIA competencies and would be interesting to

clinical degree students. The project team incorporated the expert feedback into the second iteration of the curriculum.

Designing the subject for online learning was a way to support access to the curriculum across geographical, institutional and professional boundaries. Online learning management used the Blackboard™ system of the lead university. Learning is designed to be somewhat self-directed, guided by a detailed study guide and a choice of weekly activities on a theme. Structured group learning is incorporated through asynchronous interactions with the project team and other students, based on student work shared in discussion forums each week. Assessment is varied and progressive and uses staff and peer feedback: pre- and post- semester tests and surveys; a short piece of writing each week based on scholarly and industry resources available openly on the internet; and a literature review on a topic negotiated by the student and shared online in the final week.

A trial version of the subject started in March 2015 with the main aim of evaluating student learning experiences and outcomes. Students from across Australian university clinical health profession degrees were recruited via emails to university degree coordinators and deans and directors of teaching in health sciences and through the media channels of relevant professional organisations. Since the subject is not yet approved for credit towards a university degree, participants were offered incentives: free enrolment and a certificate of completion showing the standard of work achieved. We received over 40 expressions of interest, and 20 students from 10 clinical professions were selected for the trial. Quantitative and qualitative analysis of learning experience and outcome will look at: student participation, student assessment results, pre- and post- trial tests of informatics knowledge, and pre-and post-trial surveys to measure possible demographic and other factors, such as participants' internet communication skills and readiness for interprofessional learning. The experiences of both students and teaching team members during this trial are intended to inform further iterations of the learning design for the online subject, and one or more models for its ongoing operation as a credit-bearing university subject.

Open access to the final version of the curriculum – based on our interpretation of CHIA competencies, our designated learning activities and our selection of learning resources – will be provided online via the project website ([www.clinicalinformaticseducation.pbworks.com](http://www.clinicalinformaticseducation.pbworks.com)) at the conclusion of the student trial period in mid-2015. Open access to a more detailed report on the project including preliminary analysis of the trial will be available online later in 2015. Opening the curriculum adds further opportunities for all clinical degree coordinators to consider how to embed competencies into the core of their degree studies. Introductory elective subjects offered semester-by-semester are a partial solution only to the need for all clinical health professionals to be educated in health informatics as part of their professional practice.

### **3. Discussion**

It was essential for our project to differentiate between technical / vocational, undergraduate and postgraduate levels of learning activities and learning outcomes in order to develop a subject that was appropriately located within the Australian Qualifications Framework. By using the framework of the CHIA competencies but setting aside the prescribed forms of knowledge (comprehension, application or

analysis) associated with specific CHIA competencies, we were able to design a curriculum that introduces postgraduate clinical professionals to the field. Questions around the equivalency between completing a postgraduate subject such as ours and passing the CHIA examination will require further consideration among the professional and educational bodies concerned.

We knew that the CHIA competencies were designed for intending health informatics practitioners regardless of their academic degree or career path, designed to certify as professionals people who were not necessarily clinically qualified, and designed as preparation for them to work not only in clinical settings but also in other health settings. Our adaptation of them was one possible way to structure health informatics and e-health education to equip clinicians with the necessary new forms of clinical capability. It is important to recognise that there is scope for further refinement in this curriculum model, or for other models altogether. It is also important to acknowledge that this model provides no more than a taster for clinicians seeking education in advanced clinical informatics specialisations. Nevertheless we decided that it was important to align this subject with the CHIA competencies because they represent a current broad Australian consensus in an environment of widespread and persistent conceptual chaos about the scope of “health information” work (e.g. [16]).

Working with the CHIA competencies in this project showed the need for clarification of some fundamental assumptions in these competencies, for example their use of undefined concepts such as good practice or best practice. It pointed up some of the areas where health informatics competencies may need to be updated to give more attention to the influence of e-health, for instance developments in more participatory, social technologies and more natural, ambient user interfaces to information. It also highlighted the demand for further work on still underdeveloped CHIA specialisations - in clinical informatics, clinical research informatics, nursing informatics, aged care informatics, and others. The project was able to reflect such observations back to the CHIA Board, thus providing a 360-degree quality process; the more projects such as ours that seek to apply these competencies, the more refined they can become.

#### **4. Conclusion**

Educational needs in this area of clinical health professions curriculum are dynamic. Further development of this subject and others in the field will need to respond to evolving national and international approaches to health informatics quality assurance of practitioners and education organisations (e.g. [17]). It will need to address changes to the scope of clinicians’ professional practice with information and communication technologies that may unfold as health systems themselves evolve (e.g. [18]).

The project has made a contribution to principles in health informatics education design as well as having practical outcomes. It has not just laid the groundwork for a subject for university credit aimed at and accessible by clinical profession students in universities nationally. It has also modeled a process with which few Australian health informatics educators so far have worked, of internally and externally reviewing the design and operations of subjects and degree courses.

The project has sought and found demand among clinical health professionals for formal university-level education in health informatics and e-health, designed for clinicians. It has helped the educators and organisations involved to understand the need for nuanced and complementary health informatics educational offerings in

Australian universities. These insights may aid in further efforts to address the substantive and systemic challenges that clinical informatics faces in Australia.

## Acknowledgements

Support for this project has been provided by the Australian Government Office for Learning and Teaching. The views in this project do not necessarily reflect the views of the Australian Government Office for Learning and Teaching.

We also acknowledge with gratitude the interest and input from individuals associated with CHIA and its auspicing organisations ACHI, HISA and HIMAA, as well as from clinical degree students and staff.

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