An online health informatics subject for clinical health profession students in Australian universities:

an extension of the OLT Priority Project

Coordinated interprofessional curriculum renewal for ehealth capability in clinical health profession degrees

Final report August 2015

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Please cite as:
Gray, K., Choo, D., Butler-Henderson, K., Whetton, S., and Maeder, A. (2015). An online health informatics subject for clinical health profession students in Australian universities: an extension of the OLT Priority Project Coordinated interprofessional curriculum renewal for ehealth capability in clinical health profession degrees: Final report, August 2015. Australian Government Office for Learning & Teaching, Sydney, Australia. Available from clinicalinformaticseducation.pbworks.com

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

Contents

Acknowledgements

The project team gratefully acknowledges contributions to the success of this project made by:

- the project funding body, the Commonwealth Government Office of Learning and Teaching;
- the three partner universities which provided in-kind support for this project;
- the reference group for this project, comprising Prof Geoff McColl, The University of Melbourne, Prof Gregory Kolt, University of Western Sydney, and Dr Louise Schaper, Health Informatics Society of Australia;
- the student participants who volunteered for the 2015 subject trial and engaged in the learning activities of the *Clinical Informatics and eHealth* subject;
- the expert panel which reviewed the draft curriculum, comprising health profession degree coordinators, CHIA examination board members and ehealth and biomedical informatics specialists;
- our other colleagues in educational institutions, government, industry and the professions who provided advice and support for this project.

Achievements statement

Project title: Coordinated interprofessional curriculum renewal for ehealth capability in clinical health profession degrees: An online health informatics subject for clinical health profession students in Australian universities

Lead institution: The University of Melbourne

Partner institutions: The University of Western Sydney; The University of Tasmania

Final report completed August 2015

Project outputs:

A peer-reviewed curriculum document and a peer-reviewed paper on the learning design and trial implementation are openly accessible at the project website: http://clinicalinformaticseducation.pbworks.com

Project achievements:

The project team developed a clinical informatics and ehealth curriculum that was aligned with the Certified Health Informatician Australasia competencies and designed for postgraduate learning (Australian Qualifications Framework level 8/9).

The project team implemented this curriculum in a semesterised online subject for group learning, ran a 12-week trial of this subject from March to June 2015 and issued completion certificates to seven students from a range of health profession degrees.

The lead institution began Academic Board approval processes for offering the subject for postgraduate credit, with teaching by project team members across partner institutions and enrolment available to students across Australian universities.

Executive summary

Background

A previous project (Gray et al. 2014) found that: health informatics and ehealth was absent from the curriculum of most entry-level clinical health profession degrees; most clinical health profession teaching staff knew little about this field of study; and expert health informatics knowledge was distributed thinly across universities and departments.

The present project aimed to develop a curriculum to support health informatics and ehealth learning and teaching in Australian clinical health profession degrees.

Approach

The issue of optimising expertise was addressed through a joint project by academics based at The University of Melbourne, University of Tasmania and University of Western Sydney. The issue of engaging students and staff widely was addressed by designing a curriculum for postgraduate learning (Australian Qualifications Framework level 8/9). The issue of curriculum quality was addressed by aligning the curriculum with the Certified Health Informatician Australasia competencies, and by having it peer-reviewed. The issue of accessibility was addressed by implementing the curriculum through a semesterised online subject designed for group learning. The issue of student learning and the student experience was addressed by running a trial of this subject with postgraduate students from a range of health profession degrees.

Findings

The project gave seventeen educators the opportunity to reflect on the curriculum in detail. The project enabled a group of eighteen students to trial a subject based on the curriculum, and issued seven students with graded certificates of completion. The project produced open access resources, including a curriculum document and a conference paper.

The project sustained a national collaboration that is important for the advancement of health informatics as a field of study in Australian higher education. It laid the foundation for a credit-bearing postgraduate coursework subject that can make a contribution to improving the ehealth capabilities of Australia's clinical health workforce.

Impacts

The project generated widespread expressions of interest in the curriculum and in the online subject. The project team collected new research data on student attitudes and interprofessional learning in clinical informatics and ehealth which will be analysed in future work. The project team generated additional related educational research and development project plans for further work.

Project context and aim

Context

The term **ehealth** was coined at the start of the 21st century. While there is no consensus on its precise definition, it conveys neatly the transformative effects of the Internet and the World Wide Web on earlier ways of managing data, information and knowledge in health (ways that collectively characterise the discipline of **health informatics**).

Ehealth is expanding around the world. The United Nations World Summit on the Information Society discussed it in December 2003, and the World Health Organization established a Global Observatory for eHealth in 2005. Australia's National EHealth Transition Authority (NEHTA) began its work in July 2005, with a new Australian Commission for Electronic Health (ACeH) announced to replace it in 2016.

An ehealth-capable health workforce is a recognised factor in ensuring that ehealth works properly (Hilberts & Gray, 2014). This recognition has generated new demands on clinicians to improve their underlying health informatics knowledge and skills. Learning and development initiatives that previously were not considered appropriate for clinical health professionals are needed widely now, to support workforce performance within an ehealth context (Gray, Shortliffe, Ho, Taylor, Mars, et al., 2013; Smith, Drake, Harris, Watson, & Pohlner, 2011).

The present project was preceded by the Australian study 'Advancing ehealth education for the clinical health professions' (Gray, Dattakumar, Maeder, Butler-Henderson, & Chenery, 2014) conducted between 2010 and 2014. That study found that health informatics and ehealth were taught negligibly or inconsistently in the curriculum of entry-level clinical health profession degrees. Expert health informatics knowledge was distributed thinly across universities and departments. Most teaching staff in clinical health profession degrees did not have the knowledge or experience required to support student learning about this field of study. There was a dearth of up-to-date learning and teaching resources relevant to the Australian health system.

Aim

The aim of this project was to draw together expertise to develop the curriculum for an introductory university subject that would achieve two goals. It would indicate the foundation knowledge about health informatics and ehealth that clinical health professionals should acquire. It would be available for flexible use by staff and students in a range of health profession degrees nationally.

Project approach and methodology

Approach

The approach taken in this project was consistent with design-based research in education. The project sought to focus on the design and testing of a **significant** intervention; to involve multiple **iterations**; to do an **implementation** within a realistic setting; to have an impact on **practice**; and to contribute to the evolution of design **principles** (Anderson & Shattuck, 2012). Each aspect of this approach is treated in subsequent sections of this report. Human research ethics approval was granted by the lead university.

This curriculum intervention was **significant** for the contextual reasons outlined in the previous section, namely the demand to build ehealth capabilities in clinical health professionals.

Also, its importance lay in demonstrating an approach to developing university curriculum that was aligned with the Certified Health Informatician Australasia competencies (CHIA, 2013). There are 52 competencies divided into six domains: Health and Biomedical Sciences; Information and Communication Technology; Information Sciences; Management Sciences; Core Principles and Methods in Health Informatics; Human and Social Context. They represent a landmark 2013 consensus on health informatics foundation knowledge among the relevant Australian professional associations – the Australasian College of Health Informaticians (ACHI), the Health Informatics Society of Australia (HISA) and the Health Information Management Association of Australia (HIMAA). Thus they afford university curriculum developers a new professional standards reference point.

Further, its intention was to engage not only students but also teaching staff in clinical health profession degrees, to offer access to foundation knowledge both for learning and for teaching. For this reason, it was designed to meet national requirements for university subjects offered at postgraduate level, or Australian Qualifications Framework level 8/9 (AQF, 2013). At this level, it could be used and adapted in entry-level Master degrees, in advanced Master degrees, in graduate diplomas and in specialist certificates; as well, it could serve as a resource both in undergraduate degrees, and in research higher degrees.

Finally, it modelled an innovative approach to interprofessional education. This approach was a pragmatic response to the national scarcity of clinical informatics educational expertise, but it also had a pedagogical rationale. Interprofessional education is important for future clinicians to be able to work on complex care issues in multidisciplinary teams (Bridges, Davidson, Odegard, Maki, & Tomkowiak, 2011). Specifically, understanding information technology change in healthcare settings requires sense-making by multidisciplinary teams (Kitzmiller, McDaniel, Johnson, Lind, & Anderson, 2013). This

curriculum intervention did not set out merely to accommodate learning across the range of clinical professions. Rather it set an example of ehealth and health informatics as a field of study where interprofessional education should be promoted and supported.

Methodology

Curriculum development had three **iterations**. First, each of the four academics in the project team took responsibility for developing curriculum related to CHIA competencies that aligned with their greatest expertise. This responsibility included defining key concepts, constructing overviews, designing learning activities and selecting or creating learning resources. The project officer coordinated this stage so that all team members worked with shared assumptions and within a template, and they reviewed and critiqued the first iteration of the curriculum together. (Appendix A gives details of the curriculum development protocol.)

Second, a panel of external peer reviewers was surveyed for feedback on the interpretation of the CHIA competencies, the selection of learning resources and the value of the learning activities. Reviewers comprised CHIA Examination Group members, other health informatics and ehealth experts from the professional associations, as well as academic coordinators of clinical degrees and subjects. Their feedback was incorporated in a second iteration. (Appendix B gives details of the curriculum review.)

Third, the curriculum was **implemented** in a realistic setting. Students from a range of health profession degrees took part in a one-semester (12 weeks) trial of a postgraduate subject based on the curriculum. The subject was offered through online learning to allow for a range of student participants and to support the three-State project team to co-teach. The online environment also facilitated documentation of the learning and teaching activity for analysis. Student feedback from this trial informed a third iteration of the curriculum. (Appendix C gives details of the subject trial.)

Project outputs and findings

Outputs

The project maintained the momentum of the previous project on health informatics and ehealth education, expanded Australian university collaborations to improve education in this field, and generated further project plans beyond the current funded program of work.

The project gave seventeen educators the opportunity to reflect on the curriculum in detail, to share it through their networks and to apply it in their own work.

The project enabled a group of eighteen students to trial a subject based on the curriculum, and issued seven students with graded certificates of completion.

The project produced updates to the website for the original project and open access resources including a curriculum document, a conference paper and a presentation slide show. These resources are freely downloadable from the project website: http://clinicalinformaticseducation.pbworks.com

The project collected considerably more data than can be reported here. A further peer-reviewed publication is planned; meanwhile the Findings section presents preliminary analysis of selected data.

Findings from curriculum review

Seventeen reviewers accessed the curriculum review survey: approximately one-fifth were from the CHIA Examination Group, nearly two-thirds were academic coordinators of clinical education, and over four-fifths had previous experience developing health informatics or ehealth curriculum. Twelve reviewers completed parts of the survey where they had a particular interest in the curriculum content (Table 1).

Table 1. Curriculum review responses by competency area

CHIA Competency	Responses	%
1. Information and Communication Technology	5	41.67%
2. Health and Biomedical Sciences	1	8.33%
3. Information Sciences	1	8.33%
4. Management Sciences	1	8.33%
5. Core Principles and Methods	1	8.33%
6. Human and Social context	3	25.00%

Overall, responses strongly agreed or agreed on all three questions – whether the curriculum was relevant to the clinical professions, was aligned with the competencies, and

would be interesting to clinical degree students. Valuable critical comments were also received, for example:

"Purely from a clinical perspective, much of this is (as previously mentioned) actually not generally visible and could prove both challenging and indeed, awkward for a purely clinically focussed individual to comprehend." (Q6)
"... contemplating (e.g. from the first reference) free-text analysis of data is [fraught] with data integrity issues; and in fact should not even be proposed to students, in that the major drive for decision support is the absolute requirement for strongly codified information values, such that there is a high(er) confidence in the decisions provided by the system ... (Q9)
"There is literature on the 'clinical method' that might help, and early writings by McWhinney, that I think are very relevant here. Need to counter the mechanical view of clinical decision making that pervades HI." (Q37)

Findings from subject trial

Eighteen participants began the trial subject. Clinical health profession degree backgrounds included Audiology, Dementia Care, Dentistry, Dietetics and Nutrition, Medicine, Nursing, Occupational Therapy, Physical Therapy, Psychology and Social Work. Fifteen students were based in Victoria, and one each in the Australian Capital Territory, New South Wales, and Tasmania.

Seven participants (38.8%) completed the subject and were awarded a certificate of completion. This was an acceptable completion rate for this trial, considering that completion rates in free online education are known to be much lower than in traditional methods of educational delivery (Clow, 2013); for example fewer than 10% of students are expected to complete free online learning modules in Massive Open Online Courses (Hill, 2012).

These seven participants attained a mean overall mark of 79.02% and a median overall mark of 77.95% (range 72.7% to 87.45%). This was a good indication of balanced marking, and of the ability of the subject to cater to a variety of academic abilities.

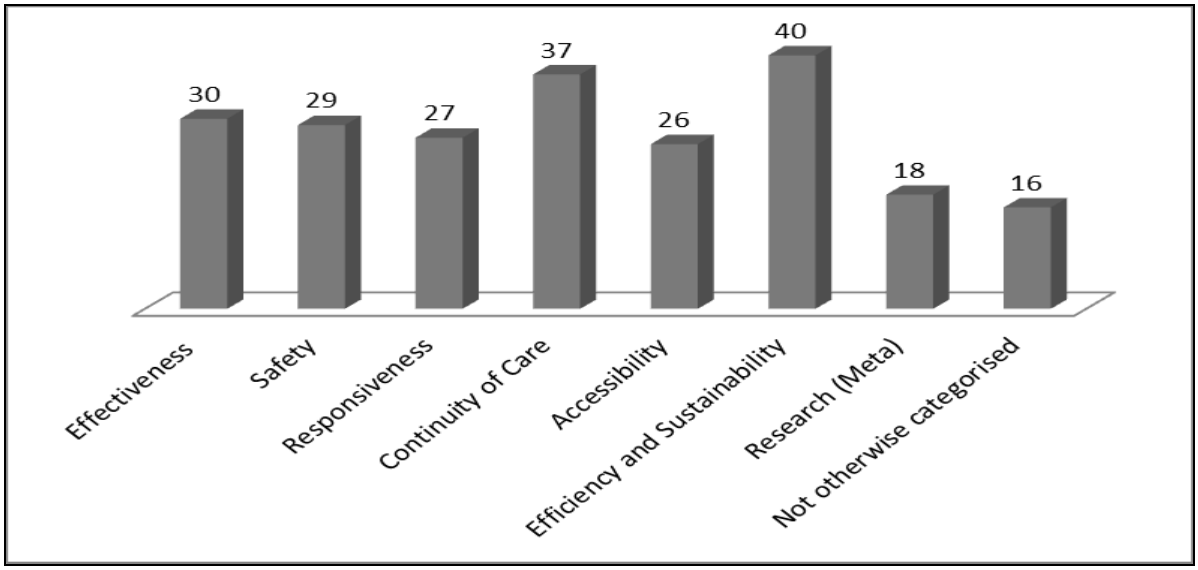
Demographic characteristics of the 7 participants who completed the subject revealed that 2 participants were in full-time employment, 3 participants were studying full-time and 2 participants were studying and working part-time. They were enrolled in a range of health degree courses: dementia care (n=1), health administration (n=1), medicine (n=1), nursing (n=2), and psychology (n=2). These results suggest that the subject catered to a variety of professional interests and study circumstances. The key reason reported by the 11 non-completing participants, namely inability to keep up with the subject workload in addition to other work or study commitments, is in keeping with the realities of postgraduate study in the health professions in Australia.

The 7 participants who successful completed the online subject reported that they committed an average of 3.7 hours per week to learning, and that this was comparable to the amount of time they would spend on an equivalent postgraduate subject in their respective degrees. Nevertheless this is well below the 10 to 15 hours per week expected in a postgraduate subject.

Statements from the preliminary test of participants' ehealth and health informatics knowledge were categorised in two ways to gain insights into the starting point for learning in the group. Analysis by sentiment type showed that most statements had positive connotations (71%), as one might expect from participants who had volunteered to take this subject. However, some statements showed uncertainty (15%) or negativity (14%) about ehealth and health informatics, confirming that this group at the outset had the capacity for critical thinking about this subject area that is expected in postgraduate study.

When categorised according to seven broad themes (Figure 1), statements showed a wide spread of emphasis. The 'Efficiency and Sustainability' theme predominated (for example, '*I know eHealth is economically confronting initially, however the long term benefits in terms of sustainable health care and increased productivity suggests the benefits well outweigh the potential financial risks')* followed by the 'Continuity of Care' theme (for example, '*I know clinical informatics and e-health can enable patient's higher autonomy in their care – the development of patient portals and individual health records (eg. MyHR) enable patients access to their health information. This provides patients with a sense of greater control and involvement in their care')*.

Figure 1. Participants' ehealth and health informatics preliminary knowledge, by themes (derived from National Health Performance Framework, 2009)



Statements in the 7 participants' post-tests of their ehealth and health informatics knowledge showed a greater number of citations to support opinions, illustrating that participants were able to apply learning resources. In contrast to the preliminary test

statements - mainly unsubstantiated opinions, anecdotal observations and untested assumptions - the post-test statements' use of evidence and examples in the arguments showed that development of a postgraduate level of subject knowledge had occurred.

The 7 participants' post-tests also used a greater number of words than their pre-tests (2344 words compared to 1852 words, in total). There was an increase in the number of different words used in their post-test statements (818 unique words, compared 612 in the pre-tests). Similarly, there was a slight increase in the mean lexical density from 33.05% in pre-test statements to 34.9% in the post-test statements, indicating the ability to utilise a higher volume of content-related concepts by the end of the subject. In addition, new salient words emerged in their post-test statements, indicating learning of specialised terminology and concepts related to health informatics. For example, in the post-tests there were five occurrences of the word 'interoperability', a word not seen at all in their pre-test statements. This analysis of finishing statements gave further evidence that the subject effectively supported these students to build detailed ehealth and health informatics knowledge.

Data on student experiences, from the post-trial survey, showed that 6 out of 7 participants (85.7%) either agreed or strongly agreed that they were satisfied with the subject. Participants reported numerous helpful aspects of the subject to be: learning as a multidisciplinary cohort; the opportunity to choose learning activities which appealed to the individual's learning style; the provision of relevant links and resources; the breadth of content coverage; the literature review assignment; reading the discussion forums; remote and self-guided learning; and a timed, structured approach which included weekly tasks. Participants also suggested a few ways in which the subject could be improved: including more external video resources; having scheduled lessons and tutorials; concentrating exclusively on the Australian context and examples in order to narrow the scope and expectations of the subject; and adjusting weekly submission due dates to include weekends. Some of these suggestions are contrary to providing flexibility and quality in this mode of learning but would have merit in other modes. These findings suggest that the subject met its aim of providing a meaningful interprofessional learning experience.

Project impact and dissemination

Impact

The project's impact on **learning and teaching practice** and the contribution to **educational design principles** are shown in Table 2.

Table 2. IMPEL model of actual and projected changes (OLT, n.d.)

	Actual July 2015	Projected July 2016
1. Team members	This project was a rare opportunity for shared academic development about curriculum design and online teaching practices in this field of knowledge.	The project is expected to provide team members with further academic development and related collaborations, through team teaching of a credit-bearing postgraduate subject.
2. Immediate students	Eighteen students had the opportunity to explore the subject; all of them interacted with an interprofessional peer group and received feedback on their learning; seven of them received final grades and certificates of completion.	Students who completed the subject said that they felt more networked and more prepared to work with ehealth and health informatics in the future. Others may follow the example of one, who decided to pursue a Master of Information Technology with a Health specialisation and to seek employment in the field: *"My learning … has helped immensely in my transition … into my first Health IT role. I recently applied for, was interviewed and then offered employment at [major hospital chain] as an Application Support Officer…. The online course material allowed me to express relevant and up-to-date knowledge, so I could stand out from the other candidates and win the job."*

3.	Spreading the word	Through the invitation to review the curriculum, the project alerted ehealth and health informatics experts and clinical health degree coordinators to this initiative nation-wide. Through the call for expressions of interest in trialling the subject, the project promoted the existence of this subject, and the existence of national competencies, to clinical health profession students across Australia.	Project team members and participating reviewers and students will reach national networks by word of mouth. Project team members' scholarly networks and social media channels will reach an international audience.
4.	Narrow opportunistic adoption	Individual reviewers were influenced to revise their own curricula in light of this project's reference to CHIA competencies. For example, a short course offered in April 2015 claimed to be*"aligned with the CHIA competencies".*	Individual educators in degrees in health informatics and clinical health professions will appropriate elements of the open curriculum produced by this project in their own teaching practice.
5.	Narrow systemic adoption	The project did business modelling of 9 options for sustainability of the subject to beyond the trial period.	The project team agreed to plan towards a credit-bearing one-semester postgraduate online subject hosted by lead university, team-taught by the partner universities, and available to clinical health profession degree students in any Australian university from 2016 onward.
6.	Broad opportunistic adoption	Broad opportunistic or systemic adoption of this curriculum the end of the funded project period was out of scope, given the scale of resourcing for this project.	The project team will continue to advocate for broad opportunistic and systemic adoption of this curriculum, through its adaptation and integration in one or more clinical health profession degrees in multiple schools and departments of health science.
7.	Broad systemic adoption		

Dissemination

Engagement during the project occurred through the development of the project proposal in consultation with the national associations auspicing the CHIA competencies, and the use of their membership communication channels; through the methodology of an expert review and a student trial; and through regular updating of the project website.

Transfer of project outcomes was enabled by the provision of open access resources; by presentation of project findings at the national Health Informatics Conference HIC in August 2015; and by ongoing involvement of project team members in the educational development activities of their universities and professional associations.

In the OLT Priority Project that preceded this extension project, the broad climate of readiness for change – including among policy-makers, employers, professions, and universities – was assessed as warming to the idea of this curriculum development and subject trial. During this project, attitudes among these stakeholders remained very encouraging, and the project received positive recognition. Realistically, resources in the health sector and the higher education sector remain too thinly stretched to support rapid strides toward mainstreaming ehealth and health informatics education in clinical health profession degrees. However the long term prospects are promising.

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Appendix A. Curriculum development protocol

General assumptions for curriculum development were that learning activities:
Align with CHIA competencies
Target Australian Qualifications Framework level 8/9
Suit multi-professional and interprofessional learning
Represent a total time commitment of 12+ hours learning per week for 12 weeks
Rely on resource based learning, using a variety of free full-text online resources - open-ended self-updating where possible otherwise no older than 2010 – from scholarly and industry sources
Be relevant for health professional practice in local, national and international settings, reflecting Australia's university student population and health workforce regulations

A templated example of one week of the curriculum is shown here:

Week	Week 11 of 12
Developer	Kathleen Gray
Area mapped directly from CHIA exam guide	CHIA Competency 6 - Human and social context
Overview	This week, week 11, you are going to study the last of the health informatics competency themes that have been defined by the Certified Health Informatician Australasia system CHIA. CHIA Competency 6 looks at the human and social context of information and information technology in healthcare and biomedicine. I hope you will agree that human factors and social contexts have cropped up in many of the themes and topics that you have studied so far in this subject. So why do these considerations rate their own special competency? Because there's a lot of evidence that they need more attention, or in other words, there's not a strong body of evidence about exactly how human factors and social contexts influence information technology and information management. For example, in the 2014 Yearbook of Medical Informatics, two American researchers Vimla Patel and Thomas Kannampallil published a major review of the international research that has been done into this field. They concluded that the use of human factors and ergonomic methods is still in its infancy here. We need to know more about how designers and developers of health information technology innovations could and should mesh with the social fabric of clinical settings. It seems that we don't know nearly enough about what can happen when complex new technologies meet the complex clinical settings. As a clinician, the more you learn about this aspect of health informatics, the better equipped you are to communicate your clinical knowledge in

	the planning, implementation and evaluation stages of IT projects. So, this competency has four topics for you to choose from: 1. Technology and social aspects of health informatics 2. Ethical and legal issues for health informatics 3. Policies, principles and guidelines for health informatics management 4. Usability and human factors
Sub-topic 1 mapped from CHIA competencies	Technology and social aspects
Learning Outcomes mapped from CHIA competencies	Discuss the areas of design, evaluation and social sciences taking into account technological limitations.
Learning Resource	VanGemert-Pijnen, J. E., Nijland, N., van Limburg, M., Ossebaard, H. C., Kelders, S. M., Eysenbach, G., & Seydel, E. R. (2011). A holistic framework to improve the uptake and impact of eHealth technologies. Journal of medical Internet research, 13(4). http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3278097/
Learning Activity	Read the van Gemert-Pijnen paper. Find one other journal or conference paper describing how someone else has used the CeHRes Roadmap. Write a short report explaining why the Roadmap was developed, and summarising how it was applied in the example you found.
Sub-topic 2 mapped from CHIA competencies	The relevance of ethical and legal issues for health informatics
Learning Outcomes mapped from CHIA competencies	Apply good practice to ethical, legislative political and regulatory obligations related to health information management (e.g. protecting the privacy of consumers).
Learning Resource	Australian Government. Office of the Australian Information Commissioner. Privacy Fact Sheets: Health and eHealth. http://www.oaic.gov.au/privacy/privacy-resources/privacy-fact-sheets/health-and-ehealth/
Learning Activity	Review the Privacy Fact Sheets. Choose one as the basis for a general knowledge test. Compose 5 True or False questions, then ask 10 people to answer them. Write a short report showing your questions and discussing your findings.
Sub-topic 3	Policies, principles and guidelines for health informatics management

mapped from CHIA competencies	
Learning Outcomes mapped from CHIA competencies	Apply good practice to the collection, use, disclosure, access, protection and destruction of health information.
Learning Resource	PHRN Population Health Research Network. http://www.phrn.org.au/
Learning Activity	Review the PHRN website. Prepare an infographic that explains the role and illustrates responsibilities of a health data custodian. Here's one place you can get advice on how to make an infographic: http://www.theguardian.com/global-development-professionals-network/2014/aug/28/interactive-infographics-development-data
Sub-topic 4 mapped from CHIA competencies	Usability and human factors
Learning Outcomes mapped from CHIA competencies	Apply good practice to human centred design, usability, human factors and ergonomic sciences.
Learning Resource	Yen, P. Y., & Bakken, S. (2011). Review of health information technology usability study methodologies. Journal of the American Medical Informatics Association, amiajnl-2010. http://jamia.bmj.com/content/19/3/413.full
Learning Activity	Read the Yen paper. Select a health information or communication technology that you have used. Write a short report analysing its usability strengths and weaknesses in terms of user, task, system and environment factors.

Appendix B. Curriculum review

Participants

Twenty-five experts were selected from health profession degree and subject coordinators, members of the CHIA Examination Group, and other members of national ehealth and health informatics organisations who had expressed an interest in the project.

Measures

An online survey set out each of the 52 sub-topics of CHIA competency, along with associated learning activities and resources developed by the project team. The sub-topics were arranged under the relevant area of competency (1 through 6).

The survey asked for responses on a 5-point Likert scale to three questions about the curriculum for each sub-topic:

- How relevant are the learning activity and resource(s) to the clinical professions?
- How well do the learning activity and resource(s) align with the CHIA competency?
- How interesting are the learning activity and resource(s) for a clinical health degree student?

Respondents were also invited to make open-ended comments, and to rate their level of expertise in each sub-topic as low, medium or high.

Procedure

An invitation to review the draft curriculum was emailed to experts. The email contained a link to the online survey. The survey was open during December 2014 and January 2015.

Because of the length of the survey and the breadth of curriculum topics, respondents were encouraged to review the sub-topics in the area of competency that interested them most. They had the option to prioritise and review all 52 sub-topics in all six areas of competency if they wished.

The survey was designed to allow respondents to read all questions whether they completed any or not.

The survey was anonymous. Respondents were asked only to say whether they were: associated with the CHIA Examination Group; a degree or subject coordinator in a clinical health degree; experienced in developing curriculum for ehealth and health informatics.

Appendix C. Subject trial

Participants

A call for expressions of interest from postgraduate students to undertake a free trial of a non-credit-bearing subject was disseminated nationally through professional organisations, education networks and social media channels. The inclusion criteria specified that applicants had to be either a current university student or a recent graduate (2010 onwards) of a clinical health science degree. Expressions of interest were received from 41 suitable applicants. 18 applicants were selected, based on assembling a group drawn from a range of health profession degrees and States. The number of participants had to be large enough to create a meaningful group learning experience, but small enough so that it did not overload the project team with teaching and assessment work.

Measures

Participants completed two activities designed to gauge their learning: tests and assignments. A test of informatics knowledge was administered in the first and final weeks of the trial as a hurdle requirement, i.e. necessary to complete the subject but not graded. The first test asked them to try to list and briefly describe ten things about clinical informatics and ehealth that were relevant to their professions and careers. The final test asked them to revise this list. In revising it they had to order the items from greatest relevance (number 1) to least relevance (number 10), and to show how they used subject learning activities and subject learning resources to explain and rank each list item. Participants were required to do graded assignments of two kinds which combined to calculate a final result. Short pieces of weekly writing were marked by the teaching team member facilitating that week of the subject. A pre-recorded project presentation due in the last week was double-marked by teaching team members.

As well, participants completed pre-and post-surveys designed to identify factors that might influence their learning. The pre-trial survey had three sections: demographic details, a measurement of internet skills (items adapted from the Internet skills survey, van Deursen, van Dijk & Peters, 2012) and attitudes towards interprofessional learning (items adapted from the Readiness for Interprofessional Learning Scale RIPLS, Williams, Brown, Palmero, McKenna, Boyle, et al., 2012). The post-trial survey asked participants about their perceptions of factors which facilitated their achievement of learning outcomes, levels of motivation and engagement, and their overall satisfaction with the subject (items were adapted from the Online Learning Environment Survey, Trinidad, Aldridge, & Fraser, 2005; and from e VALUate, Oliver, Tucker, Gupta & Yeo, 2008).

Procedure

The project leader and project officer implemented the curriculum for online learning, using the online learning management system of the lead university. The 52 CHIA sub-topics were divided into blocks of approximately 5 per week over 10 weeks, with an introductory week and a student project week making up the 12 weeks of a semester-long subject. Each week's learning resources included a short introduction by the responsible team member. Learning was designed to be somewhat self-directed, guided by a detailed study guide and a choice of weekly activities. Structured group learning was incorporated through asynchronous interactions with the teaching team and other students, based on students lodging their work and reviewing others' work in discussion forums each week. Teacher feedback was provided to students individually each week via the online comment and grade facility in the learning management system.