

Designing for Quality: The Understanding Dementia MOOC

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Abstract: The introduction of Massive Open Online Courses (MOOCs) as a vehicle for education delivery presents opportunities and challenges. In the context of the Wicking Dementia Research and Education Centre (Wicking Centre), the driver to develop a MOOC was the promise of addressing the international deficit in evidence-based dementia education, as well as the lack of research into international perspectives on dementia. The Wicking Centre's activity integrates research and education, framed by the concept of 'quality of life across the trajectory of dementia.' With dementia emerging as *the* public health issue of the 21st century, lack of dementia education at multiple levels, professional and non-professional, is of increasing concern. The disruptive character of MOOCs, with associated risks and uncertainties, warranted the application of a research-oriented project management approach to development. This included investing resources in gathering and analysing data to underpin each phase of decision-making. We used a design-based research approach incorporating the concept of 'life-cycle of an e-learning design' (Phillips et al. 2012). Data collection and analysis focused on three dynamically interacting components: 1) expertise in dementia knowledge and dementia education; 2) a cohort-centric approach to design and delivery, and 3) models and designs for MOOCs currently promoted, discussed and reported in the higher education discipline. Laurillard's Conversational Framework, relating types of learning, teaching-learning activities and the digital technologies that support them (2012), informed the selection of digital technology elements for massive-scale engagement of our identified cohort. The paper describes the initial design process and the outcomes of the limited release pilot that informed the first full offering of the MOOC.

Keywords: MOOC, Open Education Resources, Dementia, Education, Online Learning, Design

1. Introduction

This paper addresses the design and pilot of a Massive Open Online Course (MOOC) about dementia, an issue of global importance. Dementia refers to a decline in cognitive and behavioural function, primarily as a result of neurodegenerative disease. The trajectory of most dementias is progressive mental and ultimately physical degeneration, leading to death over a variable period, usually 3-8 years from diagnosis. The prevalence of dementia worldwide has sharply increased as populations age, with numbers expected to double by 2030 and triple by 2050 (World Health Organization 2013). In the Australian context, and consistent with these figures, it is estimated that the number of people with dementia will increase from 298,000 to 891,000 from 2011 to 2050 (Australian Institute of Health and Welfare, 2012). To accommodate the care needs of this group, it is estimated that the current aged care workforce in Australia must quadruple (Productivity Commission 2011). There is, therefore, a need to provide quality dementia education for health professionals, care workers and family members who care for people with dementia. A lack of dementia knowledge has the potential to diminish the quality of care, and thus quality of life, for the person diagnosed, particularly at the end of life stage (Mitchell et al., 2004, Di Giulio et al., 2008, Sampson et al., 2005). Caring for people with dementia involves a range of management and decision-making requirements including those associated with diagnosis, health and social support, medical management, carer support, behavioural strategies, psychological and psychiatric care, and palliative and terminal care.

The authors work at, or are otherwise affiliated with, the Wicking Dementia Research and Education Centre (Wicking Centre), Faculty of Health, University of Tasmania. The Wicking Centre integrates expertise in neuroscience, translational dementia research and dementia education. In particular, the educational programs of the Wicking Centre brings together research-based knowledge of the neurobiological basis of dementia with evidence-based approaches to the care of people with dementia. In this regard, care strategies are developed through the prism of dementia as a degenerative, progressive and terminal condition. Recognising that dementia is a problem of global significance, the Wicking Centre sought to extend its reach, and increase the global awareness and understanding of dementia through its educational programs.

The Wicking Centre introduced an Associate Degree in Dementia Care for domestic Australian students in 2012. The course was targeted at non-traditional learners: people primarily employed in the aged care industry as personal and community-based carers for people with dementia. The course was further developed into a fully online Bachelor Degree in Dementia Care, available internationally in 2013. The need for large-scale dementia education delivery, in conjunction with the Wicking Centre's particular expertise in both dementia research (investigating the nature of the disease) and dementia education (providing health professionals with evidence-based knowledge to inform their practice), was a driver for the decision to investigate the new pedagogies and learning platforms being developed in response to the disruptive technology that is MOOCs. Despite the high risk of expending considerable resources to develop a free education service, it was clear that a MOOC design had potential to address the problem of scale, and reduce the education deficit internationally. In particular, it presented an opportunity to serve non-traditional cohorts, particularly care workers and family-based carers, who typically do not have access to formal education opportunities.

2. Open Education and Massive Open Online Courses (MOOCs)

2.1 Open Education

Universities have a long tradition of freely sharing information and knowledge but, over the last century, access to this information has become increasingly restricted due to commercialisation and a market-driven approach to education delivery. The emergence of Internet technologies has enabled increased access to information and knowledge, and various 'open' initiatives have emerged to challenge the restricted commercial model.

At its core, Open Education emphasises the 'public good' over the 'private good'. It provides opportunities to those who find it difficult to access education via traditional channels. This might include people from disadvantaged backgrounds and those in developing countries. However, in addition, a University might adopt Open Education:

- to enhance reputation and attract students;
- to apply its expertise to address global problems;
- to generate income;
- to improve the efficiency of learning and teaching practice;
- to improve student learning outcomes (Norton et al. 2013).

The University of Tasmania supported the development of the *Understanding Dementia* MOOC in line with its strategic intention to enhance its reputation in Open Education. The Wicking Centre's rationale for developing the MOOC was to apply its research and education expertise to address a global deficit in dementia knowledge and to enhance its reputation while attracting students into a fee-paying course, the online Bachelor of Dementia Care.

2.2 Massive Open Online Courses

The concept of MOOCs has evolved over recent years. In the original expression of the idea, an open course was offered in a distributed fashion across the Internet, outside the confines of an individual institution, to make it 'massively open'. It was taught collaboratively, with participants and course materials dispersed across the web using a 'connectivist' pedagogy, in an attempt to democratise education and empower people from disadvantaged backgrounds (Downes, 2012). As the use of this term has evolved, it has become known as a cMOOC (Siemens, 2012).

More recently, MOOC has been used to refer to a course offered freely to the world by one institution, sometimes through commercial brokerages such as MITx (subsequently EDx), Coursera and Udacity. The first instances were by high-profile US institutions supported by venture capital. Large enrolments occurred in some cases, and the concept captured the attention of the mainstream press and university decision-makers worldwide. The commercial style of MOOC has been labelled an xMOOC (Siemens, 2012), a reference to the 'x' in the name of some of the early commercial providers.

While MOOCs are a relatively new phenomenon, they build on decades of research into technology-enhanced learning, discussed, for example, in Collis (1996), Harasim et al. (1995), Herrington et al. (2010), Laurillard (1993, 2002, 2012) and Salmon (2000, 2003). A key finding of this body of work is the need for teachers to support students to construct their own knowledge. While online approaches have enriched the experiences of (previously correspondence-based) distance education students, in recent years, they have been extensively used to 'blend' on-campus activities with online activities (Littlejohn and Pegler, 2007), retaining face-to-face facilitation of learning.

Laurillard's Conversational Framework (Laurillard, 2012) represents the different kinds of roles played by teachers and learners. Used as a design analysis tool, the framework exposes the inherent constraints of a MOOC design for student learning. Teacher presence is minimal in a MOOC environment for reasons of cost and scale, and the predominant means of student-teacher interaction are through asynchronous transmission of information provided by the teacher. Embedding opportunities for engagement that enhance interactions between student and student and between student and content can compensate for any perceived learning deficits due to minimal teacher presence, but is difficult to achieve for 'massive' cohorts.

The approach taken in many xMOOCs explicitly replicates a traditional, transmissionist model of classroom practice (Borden, 2012, Knox et al., 2012). As an example, Norvig's (2012) approach to a 100,000-student artificial intelligence MOOC is representative of a minimalist teacher presence. The design of cMOOCs, by contrast, aims to create a MOOC community that leverages the shared knowledge of members, but this relies on the presence of some "more knowledgeable other in the group" (Borden, 2012). This approach requires students to engage collectively in developing shared knowledge but only works if students are motivated and technically competent to use and develop the MOOC environment.

Thus, the characteristics of students who might successfully complete a MOOC is an important consideration in a MOOC design. Completion rates in MOOCs have been reported to be around 4% (Penn Graduate School of Education 2013). Daniel (2012) argues that such completion rates would be of concern to higher education accreditation bodies and distance education providers. The distance education literature recognises that students need self-efficacy and metacognitive skills to succeed in an isolated online environment. Thus, the target audience needs to be clearly understood and assumptions about their capabilities for a MOOC environment aligned with its design.

Norton's (2013) analysis distinguishes between three general types of outcomes sought by students: learning new things; improving employment prospects; and a general broadening of the mind. He subdivides these into 11 components, and analyses which of these can be achieved effectively through a MOOC, vis-a-vis a blended educational environment. This analysis establishes that there are four outcomes that a MOOC may be effective in achieving: vocational knowledge, knowledge for its own sake, formal credentials and evidence of achievement.

2.3 MOOC Design

2.3.1 Laurillard's (2012) 'Conversational Framework and the Learning Design'

Laurillard's Conversational Framework (2012) provides a way of thinking about learning that accounts for teacher and learner activity, individual and social aspects of learning and the interaction of theory and practice. It represents "the different kinds of roles played by teachers and learners in terms of the requirements derived from conceptual learning, experiential learning, social constructivism, constructionism, and collaborative learning, and the corresponding principles for designing teaching and learning activities in the instructional design literature." (p. 93). The framework was used to inform and evaluate the learning design of the *Understanding Dementia* MOOC.

The Conversational Framework encompasses six types of learning through: acquisition, inquiry, practice, production, discussion and collaboration. Laurillard provides a map of different digital learning technologies that support those ways of learning in (2012, p. 96, Table 6.3). The peculiar affordances and limitations of learning design for a MOOC meant that in the design of *Understanding Dementia*, we focused on learning through acquisition, practice, production and, in a limited way, discussion as shown in Table 1. These are discussed in more detail in Section 3. *Design of the e-learning environment* and summarised in Table 2.

Learning through	Digital Learning Technology that serve them	Learning focus
Acquisition	Reading multimedia, websites, digital documents and resources; Listening to podcasts, webcasts; Watching animations, videos.	Expert knowledge transmission
Practice	Using models, simulations, microworlds, virtual labs and field trips, online role-play activities	Student practicing knowledge
Production	Producing and storing digital documents, representations of designs, performances, artifacts, animations, models, resources, slideshows, photos, videos, blogs, e-portfolios	Student knowledge codified
Discussion	Online tutorials, seminars, email discussions, discussion groups, discussion forums, web-conferencing tools, synchronous and asynchronous.	Student sharing individual knowledge and perspectives

Table 1: Types of Learning and Supporting Digital Technologies (Laurillard 2012, Table 6.3, adapted)

Learning through discussion includes a teacher “providing stimulus in the form of a question, or issue” and a learner to “modulate their ideas, and generate further ideas and questions” (p.98). Given that online, large-scale discussion is inherently difficult to manage from both delivery and participant perspectives, we successfully trialled a ‘discussion-like’ forum of providing sentence stems with invitation to “complete the thought”. The ‘thought tree’ was designed to facilitate a collective ‘flow’ of personal perspectives and understandings surrounding big concepts like ‘quality of life’ and ‘what the nervous system does’. The thought tree concept generated a large body of contributions from participants, achieving its intended purpose of enabling low stakes, large scale sharing of perspectives that could be analysed by the development team and also dementia researchers.

The outcome of learning through inquiry (learning through finding out) is that students “modulate their conceptual organization” (p. 98) through the process of investigation of materials, guided by the teacher. This learning type assumes a level of motivation and self-efficacy from the participants to investigate resources provided and reflect on concepts taught. We assumed high motivation, but low technical and academic literacy for our target participant cohort and therefore did not design for learning through inquiry.

The affordances of the available MOOC platform and the assumptions about the target cohort meant that our understanding of what comprised “collaboration” was challenged. According to Laurillard, collaboration “incorporates learning through discussion, practice and production.” (p. 98) Through learners exchanging experiences of learning through practice, as well as products of practice, individual actions are modulated and discussion generated. For participants of the *Understanding Dementia MOOC*, the learning experience of the MOOC functioned as a launchpad for many participants to use the content provided to initiate collaborative activity in their local context.

This may be a function of the intersection between the topic (dementia) and the cohort: over 60% of students in the first release were caring for someone with dementia. It is not surprising that such a group would be highly motivated and able to apply in practice the knowledge acquired from the course. That emergent collaboration activity occurred within localised (geographical) contexts is also a reasonable outworking of the networked nature of marketing we employed. Not for profit organisations dedicated to providing support and information about dementia, as well as aged care facilities, were contacted and agreed to advertise the *Understanding Dementia MOOC* to their mailing list.

2.3.2 Approach to the Learning Design

We approached the design of the MOOC as a ‘wicked problem’ (Rittel, 1984 [1972]). This concept applies to situations in which a problem cannot be well-defined and decision-making is best approached as a process of inquiry rather than goal-directed problem-solving. The many uncertainties currently associated with MOOCs warranted a research-oriented and iterative approach to design decisions. Thus, the design evolved over time

and was open to a range of MOOC styles, educational design methodologies and pedagogies. The iterative reconceptualising of the MOOC took into account competing tensions between MOOC style, expertise of the content developers, proposed target audience and the limitations of the available MOOC platform. Incremental partial solutions with emergent properties were then reflected on and fed into the next iteration of decision-making (Checkland and Scholes, 1999). The iterative process of investigating possibilities for the design of the *Understanding Dementia* MOOC took place over several months. We started with the target audience and desired outcomes. This led us to consider the kinds of expertise we could deliver as content, and that we needed translation of expertise into course content. We also carefully considered how to use the technology platform in ways that would facilitate the participants' role of learner (Laurillard, 2012), in particular, as reflective practitioner (Schön, 1983).

We decided to use a design-based research approach (van den Akker et al., 2006) for the specific learning environment of the *Understanding Dementia* MOOC. The concept of the e-learning design lifecycle described in Phillips et al. (2012) guided our project plan. A learning design has a life cycle from conceptualisation to maturity and is best conducted as an iterative process in which each phase of development is underpinned by data collection to evaluate and refine the design until it is considered mature. This process includes a baseline analysis, pilot phase and delivery phases that are evaluated to inform refinement of the design and enable measurement of effectiveness. The baseline analysis for the MOOC (the analysis that precedes the first phase in a design lifecycle) included online learning design principles and recommendations from publications such as those referenced in the preceding discussion about MOOCs, target audiences as well as Wicking Centre knowledge and expertise. The pilot was completed in June 2013 and the outcomes of the evaluation data fed into the subsequent design.

2.3.3 Baseline Analysis

The baseline analysis was important to establish the nature and extent of the education problem that the Wicking Centre was seeking to address and the expectations of potential and identified stakeholders, including the target audience. This analysis informed decisions on the learning design of the MOOC and also provides the benchmark against which the learning outcomes and other effects of the MOOC will be identified and measured. For example, outcomes relate to the project goals including enhancing the reputation of the University, generating income, improving (online) learning and teaching practice, and the dissemination of Wicking Centre's expertise.

2.3.4 Intended Outcomes and Audience

The goal of the *Understanding Dementia* MOOC was to provide a foundation-level course that would increase evidence-based knowledge about dementia, internationally. The target audience was deliberately broader than the Wicking Centre's existing Associate Degree in Dementia Care. It was accessible to:

- Those in Australia interested in dementia who might not be prepared to enrol in a fee-paying course;
- Those carers and others across the world who wished to access quality, evidence based information to assist in understanding dementia.

However, identifying the target cohort was initially problematic. It was clear that dementia knowledge could be of general interest to anyone and it was tempting to take a generalist approach: provide a 'wikipedia' on dementia, in the interests of being broadly appealing or non-exclusive. Initial investigations showed that many organisations were delivering high-quality general dementia information online (Pittman et al., 2012). However, no integrated course was available that provided the crucial links between neuroscience and dementia care, with the additional capacity to inform on the key aspects of a palliative approach. We chose to tailor the learning to those for whom this knowledge would have the biggest impact in terms of translation to practice, to drive evidence based dementia care, and to facilitate a broad recognition of the life-limiting nature of the condition. Identification of the target audience (health professionals, aged care workers, personal carers, people with dementia and their families) was key to informing the design and structure of the course. Furthermore, expanding the target audience internationally raised the potential for cross-cultural sharing of dementia care practices. A well-designed MOOC presented an opportunity to share those different perspectives among course participants, thereby increasing and enriching global understanding about dementia.

3. Design of the e-Learning Environment

The e-learning environment was designed taking into consideration Laurillard’s “Types of Learning and the Different Types of Conventional and Digital Learning Technologies that Serve Them” (2012, Table 6.3, p. 96). For the context of a MOOC, it was decided to prioritise ‘learning through Acquisition’ with elements of learning by Practice, Production and Discussion. Table 2 sets out the Learning focus, MOOC technology platform functions and Desired Learning Outcome in relation to the selected Learning Types.

The design of the MOOC balanced considerations of the target audience characteristics and expertise and MOOC platforms to decide on the MOOC style (xMOOC with cMOOC characteristics). Once the MOOC style was settled, other elements of the design were considered: the curriculum (what was to be taught), the learning design (how it was to be taught), the technical platform to be used, and the expertise available (both technical and domain-specific). Each combination of design elements was evaluated for its ability to meet the goals of the project: to provide international access to quality dementia education, raise awareness of dementia as a life-limiting disease of the brain requiring a care response including palliation, and to support the Wicking Centre’s ongoing research efforts.

A core team of six part-time staff (consisting of a project coordinator/manager, three technical staff, and two media personnel) developed the learning design. Content experts, who contributed material and provided advice on their particular areas of expertise, supported this team. The project coordinator/manager was also involved in all content development, ensuring a consistent approach to material delivery, and alignment of unit objectives with learning activities.

Having identified the broad range of material possible to deliver, we progressively refined the basic content design for the MOOC into three primary themes: ‘the brain’, ‘the diseases’ and ‘the person’. Within each theme, content expertise was digested and translated into a presentation format that would enable participants to reflect on and apply in their local context. A guiding principle for each module was to inform students of the theory, encourage them to reflect on the theory in their local context, and to feed back their reflections to all MOOC participants. The themes were developed into separate modules, where each module contained several parts. Each part was designed as a single, scrollable HTML page, with several components:

- Video clips of up to thirty minutes in combined duration;
- One or more reflective questions, to be entered into a ‘journal’;
- A quiz about video content;
- One or more questions to guide forum discussion;
- Other supporting materials.

Discussion questions and thought trees were interspersed throughout the modules. Thought trees were used when asking people to reflect upon big concepts. Discussion questions were used for sharing experiences, resources and research. An interactive anatomy program, Body Central, was also used to support learning about brain and neuron structure, as a foundation for understanding the pathology (abnormal anatomy) of the diseases that cause dementia.

Learning through	Learning focus	MOOC platform technology functions	Desired Learning Outcome: Learner can
Acquisition	Expert knowledge transmission (brain, disease, person)	Video interviews of experts accompanied by text transcripts; content summaries	Modulate own concept, observe teacher’s practice
Practice	Student practicing knowledge	Body Central software, quizzes, learning activities (eg. scenarios/case studies) with hints and instant feedback	Apply core concepts learned and respond to feedback to improve actions (theory into practice)
Production	Student knowledge codified	Completing the final scene within MOOC family scenarios; recording notes in a reflective journal	Consolidate learning via articulating their conceptual understanding and how they have put it into practice
Discussion	Student sharing individual knowledge and perspectives	Thought tree responses to sentence stems. Discussion forums encouraging sharing of experiences, resources and research	Modulate own ideas and generate further ideas and questions

Table 2: Laurillard’s (2012) Learning Types as designed into the *Understanding Dementia* MOOC

The individual components of the learning design are discussed in the following sections.

3.1.1 Video elements

In many xMOOCs, a single academic expert presents the content. The diversity of content here meant that a single academic or even a small group of experts would be insufficient to present the range of information required. Accordingly, we sought the input of 11 experts, locally and nationally, including scientists, clinicians, health care professionals, educators, people with dementia and carers. By including content experts with the capacity to speak on dementia from a wide variety of perspectives, we were able to integrate information across laboratory based research, as well as care practices, otherwise known as a 'bench to bedside' approach.

Online courses and MOOCs have adopted a range of content delivery styles, ranging from the use of graphics tablets, to PowerPoint or Prezi presentations, to paper-based and white-board explanations. Our baseline analysis of the target audience informed the decision to deliver the majority of content as interview-style video clips. Of the diversity of styles currently available on the Internet, two particular approaches inspired the format of our video clips: the Khan Academy uses image annotation and diagrams, with interview-style voiceovers (Khan Academy 2011), and mathematician, Dr Keith Devlin's MOOCtalk blog (2014) describes his use of paper-based illustration of examples, captured using an overhead camera. The key to Devlin's approach is the presence of hands, which convey important aspects of non-verbal communication. However, the delivery of content via an interview, in the Khan example, encourages an engaging conversational discourse that enables clarification of difficult concepts as one person takes on the role of the participant. Employing the strengths of these two approaches, we chose to use the interview format for most clips, with the addition of an iPad, graphics tablet or widescreen computer monitor for demonstrating images, drawing diagrams, or presenting text to enhance the explanation of certain content. The interviewer adopted the position of the MOOC participant to contextualize the content and regulate its complexity. Two cameras were used in all videos to add editing flexibility and viewing interest.

3.1.2 User interface elements

In line with the e-learning project management literature, organizations like Open Universities Australia and the University of Phoenix have adopted a standardised curriculum and instruction method to ensure consistent quality and to lower costs (Norton, 2013). However, it became evident early in the process of *Understanding Dementia* MOOC development that this approach lacked the flexibility required to accommodate our diverse content. Rather, content delivery was determined by the particular professional discipline of the presenter, their delivery style, the types of supporting resources and the nature of the material. For example, one content expert used role playing to communicate content, another used hand-drawn graphs on an iPad, and yet another used images presented on a wide-screen computer monitor. Our learning design balanced standardisation with flexibility, accommodating diversity of presentation approaches to ensure that the primary focus was on communication effectiveness, whilst maintaining a coherent curriculum.

3.1.3 Interactive elements

There is increasing evidence to support the efficacy of games as learning tools (Grimley et al., 2012, Muntean, 2011) and we followed this approach by developing the interactive anatomy program, *Body Central*. This software, originally designed by the *Understanding Dementia* project coordinator to assist first year nursing and paramedic students to study Bioscience, was adapted for the MOOC to assist participants to learn the basic anatomy of the nervous system. This software was readily configurable by the content developer, with an image uploader, question database, progression editor and mini-games to test knowledge and retention. In a recent trial, the software was demonstrated to improve quiz scores by 80% compared with conventional paper-based study methods (unpublished data).

3.1.4 Reflective elements

The course was structured to encourage participants to assume the role of reflective practitioners (Schön, 1983). The content, presented by experts in their particular fields, was deliberately non-exhaustive to encourage discussion and debate. Dementia is a contentious and emotive area, with divergent opinions on such issues as diagnosis, stigma, rights and care practices. The learning design included a function enabling participants to record their own reflections about case studies and scenarios, while discussion questions were

deliberately structured to enable participants to consider divergent approaches, share their own experiences or to research and share, for example, their local circumstances. Furthermore, rather than being a didactic or prescriptive experience, the intention was for the course to provide a 'melting pot' for international perspectives on dementia knowledge and practices.

Content and Copyright issues

The issue of copyright was a major concern and the project team sought expert advice to ensure content design decisions were legally compliant and aligned with the Open Education principles to which the Wicking Centre subscribed. Australian Universities are subject to more restrictive copyright laws than, for example, those in the United States (Norton, 2013). Teaching resources were, thus, restricted to those already owned by the content developers, those that could be obtained under open licences or those that could be created specifically for the course. This both added to the development cost of the project, and drastically limited the diversity of resources that could be presented. An additional consideration was the Intellectual Property implications of making available Wicking Centre/University of Tasmania content, including potential loss of income opportunity. Nevertheless, a decision was made to release content developed as part of the *Understanding Dementia* MOOC under a Creative Commons Attribution, Non-Commercial, Share-Alike license. This decision allowed for the development of openly accessible content that supported our intended cMOOC approach. However, the approach taken was at odds with the xMOOC aspects of our learning design, as many xMOOCs do not provide content that can be, for example, reused, remixed or repurposed.

4. MOOC platform and course design

The open instance platform available to the project was largely untried for large scale course delivery. The instance was primarily designed for use as an open educational repository, with limited functionality as a learning environment. This posed significant challenges for the *Understanding Dementia* MOOC design. However, positively, it forced the team to start with pedagogy, and adapt existing tools, rather than defaulting to a design approach that used online technologies because they were available, without clear pedagogical justification. In addition, our cohort-centric approach meant that we could not presume a particular level of prior education or any level of technical proficiency.

The learning styles underpinning Laurillard's (2012) Conversational Framework and the digital technologies that serve them (p96) informed design choices to focus on learning through acquisition, practice, production and discussion. Learning through acquisition was prioritized because of a design assumption of low threshold learning capabilities of target student cohort (technical and academic literacy) coupled with the high value of expert content that we wished to make available.

In terms of the interface with students, courses hosted on the closed instance of the platform were structured as a sequential list of content links that were designed to be progressively navigated by students. A decision was made to stylise the interface using html programming such that content was embedded in the familiar surroundings of a scrollable web page design. Colour-coded backgrounds and activity icons were implemented as visual standards to organise the content, while the distinct course units were arranged into separate pages with navigation arrows at the top and bottom of each page to facilitate progression. Each module within a unit could be downloaded as a stand-alone HTML document, with which students can interact offline.

5. Understanding Dementia Pilot

In line with the e-learning design-based process (Phillips et al., 2012), a pilot was used as the first phase in the design life cycle. The absence of any other courses on the open instance platform allowed us to implement a restricted release with opportunities to test and identify improvements to the platform, as well as refinements to the design.

A 3-week version of the full 11-week course was trialed April-June 2013 as a soft launch with 184 participants, 128 of whom were active in the course. The pilot was particularly useful in identifying a suite of recurring issues relating predominantly to the registration process, site navigation and technical problems. Many of the issues were resolved during the course of the pilot, while others are being negotiated with the commercial provider as part of platform development. Participants suggested a variety of improvements, including the incorporation of bullet-point summaries of video clips, and task completion checklists, both of which will be implemented in the full release. Twenty-seven participants completed the final feedback survey, which

gathered a broad range of data relating to course design, structure, content, accessibility and navigability. Our approach to content delivery was rated highly by the majority of participants:

"The range of presenters and presentation styles, eg case histories as well as professionals, gave breadth to the course." (Pilot participant feedback)

"The in-house videos are exceptionally good ... both in content and quality." (Pilot participant feedback).

92% of respondents rated the course as either good or excellent (top two options), while 88% stated that they would be interested in completing the full course based upon their pilot experience.

"This is a fantastic learning opportunity for professionals and families and suffers of Dementia. It is well put together and easy to understand." (Pilot participant feedback)

The pilot data was not intended to mirror our likely audience for the full-release, as participants were primarily recruited from Wicking Centre, School of Medicine and School of Nursing and Midwifery academics and their networks. Interestingly, word of mouth and social media recruited participants from all over Australia, from a diversity of backgrounds and motivations for learning about dementia. These additional participants potentially reflected the anticipated general level of interest and attraction of the *Understanding Dementia* MOOC. The pilot also demonstrated that a range of qualitative and quantitative data can be collected, validating the tradeoff between cost of delivery and benefit to Wicking Centre research.

Several key design elements evolved from the Pilot and were incorporated into the Full Release, reported in Kelder et al. (2013). In summary, the full release learning design introduced:

- glossary of terms;
- course overview, profiles page and orientation modules;
- content summary slides at the end of each video clip delivering new content;
- 'thought trees' to enable students to contribute to discussion forums in a less threatening environment and anonymously;
- MOOC family cartoon scenarios to present case studies in a more engaging manner;
- questions designed to facilitate review of the content, separated to facilitate navigation;
- hints and instant feedback for each question to enable students to evaluate their own learning.

6. Conclusions

This paper has presented an education design project undertaken by the Wicking Dementia Research and Education Centre to develop the *Understanding Dementia* MOOC.

Several conclusions can be drawn from the outcomes of the *Understanding Dementia* MOOC development project.

- Value of a theoretical underpinning to the learning design – guiding choice of digital technology elements and providing criteria for evaluating their effectiveness
- Value of a design-based research approach to the learning design – iterative and incremental data collection and analysis directed toward improving the design with opportunity for measuring effectiveness and impact in later design phases
- Importance of resourcing a design-based approach that is evidence based

The baseline analysis, including of the Wicking Centre's research expertise and the target audience, resulted in the decision that the transmissionist, xMOOC style was broadly appropriate, with features of cMOOC incorporated to facilitate and leverage student engagement. The intention was to share the Wicking Centre's knowledge, and encourage participants to apply that knowledge to their own contexts. At the same time, the *Understanding Dementia* MOOC was designed to provide an opportunity to contribute to international approaches to dementia care, through providing a forum for participants to share their experiences within different contexts. This added a connectivist element to the *Understanding Dementia* MOOC design.

Laurillard's (2012) framework connecting learning styles with digital technologies provided a starting point and guidance for decision-making around the structure and processes built into the learning design. The affordances (and limitations) of the technology platform available to deliver a fully online, open access course

meant that we could develop a design that focused on enabling individual learning through acquisition. We were further able to design in opportunities for learning through practice, production and discussion to a limited extent. The framework also provided criteria for analysing the effectiveness of the design.

An important driver for developing the MOOC was to leverage the data which could be generated through its delivery. This included supporting discipline research into international perspectives on dementia care in general, and evaluating the impact of the Wicking Centre's expert content. In addition, the data collected was intended to support research into the scholarship of learning and teaching in the MOOC context. The inclusion of research as an output of the MOOC was agreed with the understanding that this would imply and require a higher contribution of staff time to manage interactions and viewpoints than is usual in xMOOCs. A purposeful tradeoff was thus made between unfunded teaching costs and the potential research outputs.

Of the four effective uses of MOOCs identified by Norton et al. (2013), the *Understanding Dementia* MOOC was initially designed to achieve vocational knowledge and knowledge for its own sake. However, the course has recently been incorporated into a pathway for formal credentials and evidence of achievement, via articulation with an elective unit in the Wicking Centre's fully online Bachelor Degree in Dementia Care. Evidence of the success of our design approach is demonstrated by the high rate of MOOC completion (39% of registrants) and subsequent transition of 273 participants into the Bachelor of Dementia Care course.

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