Design principles for Massive Online Courses: examples from first year teacher education

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A new set of 'common first year' teacher education units has been developed at an Australian university. This paper discusses the further development of these units for large enrolment online degree programs. A needs analysis was performed and contemporary best practice consulted to develop a set of design principles that guided the redevelopment. The implementation of the design principles is discussed, and a formative evaluation of the conduct of the revised units is reported. Student and tutor feedback supported the new unit designs, but also identified some areas for improvement.

Keywords: educational design, learning design, AITSL standards, first year experience, pre-service teaching, MOOC

Introduction

The design of online learning environments that combine effective pedagogy with appropriate use of technology is an ongoing area of interest in higher education. This paper describes the (re-)design and (re-)development of units of study (courses) in the first year of a teacher education degree offered fully online through Open Universities Australia (OUA). Open Universities Australia is a business consortium which offers students from any background the opportunity to pursue their university dream without any prerequisites other than the ability to pay their fees. OUA students, therefore, come to university with very diverse skills. Most students are mature aged, and, while some have other qualifications, many have only a secondary education, which may be incomplete.

Background

In 2012, a School of Education at an Australian university became the first institution to be accredited to the new Australian Institute for Teaching and School Leadership (AITSL) standards. In order to meet these requirements, the entire Bachelor of Primary Education and Bachelor of Early Childhood Education courses/programs were redesigned from the ground up. Part of the redesign involved a set of eight Common First Year (CFY) units of study across both courses.

These degrees are offered to hundreds of on-campus and regional enrolees of the university, but also to thousands of OUA students. The CFY units were offered in 2013 only to direct students of the university. The project reported here focuses on the revision of the new units, following their first offering, for the much larger cohort of OUA students. The project was also aligned with various elements of the university's Strategic Plan.The School of Education was in a good position to respond to these initiatives, because student-centred pedagogy was already entrenched in the School. In particular, the School had a history of using workshops instead of lectures, and continuous assessment instead of examinations.

This paper discusses the redesign of the common first year units, based on a set of best-practice design principles. It then outlines a formative evaluation of that redesign, before presenting the results of that evaluation.

Literature

This work is informed by Kift's (2009) six First Year Curriculum Principles, which are particularly relevant to OUA students:

- **Transition:** from their previous educational experience to learning in their discipline;
- **Diversity**: accessible and attuned to student diversity;
- **Design**: learning-focussed, explicit, scaffolded and relevant;
- **Engagement**: engaging and involving pedagogy which enables active and collaborative learning;

- **Assessment**: assessment should increase in complexity from the first to later years; and regular, formative assessment should occur early in the program of study; and
- **Evaluation and Monitoring**: good first year curriculum design is formatively evaluated to improve student learning.

Approaches used in Massive Open Online Courses (MOOCs) were also adopted, because of the similarities OUA units share with MOOCs. They have massive enrolments (~1000) and they are wholly online. They differ in that they are not 'open' in the way that MOOCs are – students pay a fee to enrol. While MOOCs are a relatively new phenomenon, they build on decades of research into technology-enhanced learning, discussed, for example, in Collis (1996), Harasim, Hiltz, Teles and Turoff (1995), Herrington, Reeves and Oliver (2010), Laurillard (1993, 2002) and Salmon (2003). A key finding of this body of work is the need for teachers to support students to construct their own knowledge.

Current OUA units build on this research through facilitating students to form a community of learners, supported by online tutors. These characteristics are similar to the original, 'connectivist' cMOOC concept (Downes, 2012; Siemens, 2012), and contrast to the so-called xMOOC approach (Siemens, 2012) because of the 'x' in the name of some of the early commercial providers. In these approaches, teacher involvement is minimised.

Following this reasoning, an OUA unit can be called a 'c-MOC' – a Massive Online Course with connectivist (or constructivist) underpinnings.

Needs analysis

A Needs Analysis was performed, in which the existing unit designs were analysed in terms of their:

- suitability for fully online study;
- scalability for OUA class sizes;
- suitability for students of diverse backgrounds new to university; and
- effective use of the Blackboard Learning Management System.

This analysis of the initial offerings of the eight CFY units identified that each had its own strengths and weaknesses. Some units were designed for face-to-face teaching and were then 'ported' online. Others were designed specifically for online study. The needs analysis concluded that, if the best features of each unit were integrated into all units, then an excellent design could result. This analysis led to a set of design principles for high-quality, contemporary units that make appropriate use of technology.

In some cases, units already incorporated Herrington, Reeves and Oliver's (2010) authentic e-learning approach, while other units were found to benefit from such an approach. Benchmarking elements of Marshall's (2007) e-learning Maturity Model were also used in developing the design principles.

Design principles

A set of design principles was enunciated to guide the design of the CFY units. The intention of the design principles was to develop a much closer articulation between the offerings of the units in different enrolment modes (OUA, on-campus, regional). Rather than being seen as the main element of the learning environment, face-to-face workshops for on-campus students were viewed as an added bonus of on-campus study. This approach was underpinned by the School's decision to appoint 'unit champions', principal unit coordinators (who are typically full-time academics), who have central responsibility for the design of all offerings of a unit.

The Design Principles are discussed individually below, together with their implementation.

Guide to the course

A need was identified to clearly explain to students how the entire structure of the degree program leads towards their emerging professional identity, and how individual units contribute towards the course as a whole. A website is being developed with three components: **belonging** to the university 'community'; **becoming** a teacher through the School of Education; and **being** a great teacher. Space prevents further discussion of this initiative.

Guide for students

A further need was to provide a guide for students about how to study each unit, and why. Existing units a*ssumed* that students knew what was required, but students may have had assumptions different to those of the unit designers, especially where innovative learning designs were used. This design principle accords with Marshall's (2007) prescription (D3-3) for an explicit plan that *"guides the communication to students of the relationships between course [unit] elements"*, so that students have information about how to interpret learning activities and assessment items (p. 83).

Topic synopses

Much of the information provided to students was previously in formal, academic language. This design principle set out to communicate to students in words beginning students from diverse backgrounds could understand. Weekly online learning activities also tended to be presented as individual items without any contextual information about how the activities fitted into the unit as a whole.

The topic synopses were conceived of as brief 'advance organisers' for each topic, providing an overview of the expectations of students for each week. The topic synopses were purposely written in colloquial language to humanise the experience (Haughton, Sandt, & Slantcheva-Durst, 2014) and speak directly to students of diverse backgrounds. An exemplar is below:

> In this first teaching week we will explore the idea of the 'digital world'. This term, and similar terms, are used commonly in popular language, but what do they mean? We'll explore some definitions. We will also explore the different digital worlds you live in: your personal digital world; your learning personal world as a student; and your professional digital world when you graduate. This unit is organised around these three ideas.

> We will also help you to understand what 'sense of place' means, and why we need to change and adapt to the digital world. We will think about mobile technologies and how these are changing our lives. You'll need to read chapter 1 of the textbook, and view some thought-provoking videos to give you some background to the discussion.

> We will also get you started on your first assessment (the video presentation about "*why I want to be a teacher in a digital world*"), by providing a tutorial on video editing software. Finally, we will help you to get started on scripting your video.

Vodcasts

In line with expectations of modern unit design arising from the MOOC and flipped classroom movements (e.g., Khan, 2014 and TED, 2014), recorded mini-lectures (vodcasts) of 3-4 minutes duration were planned for each topic. These were professionally produced and edited.

Multiple vodcasts were produced for three of the four units offered during the first study period. In one case, there was one video per 4 week module; in the second case there were module overviews and weekly topic vodcasts; and in the third, content-heavy unit, there were multiple short vodcasts for particular topics. In the fourth unit, a unit coordinator was not appointed in time to create the vodcasts.

Assessment and learning activities

Substantial work with unit coordinators went into the redesign of assessment items and learning activities. Changes were made to learning outcomes and assessment items for 6 of the 8 units, in line with Marshall's (2007) best practice statement D3 "Explicit linkages are made in the design rationale regarding the pedagogies, content and technologies chosen" (p. 82).

In some cases, units were radically restructured to make them appropriate for the characteristics of the student body and the OUA environment. In other cases, relatively minor revisions were needed.

Assessment mapping
University processes already address Marshall's (2007) best practice statement L8-1 "Assessments are

described in terms of course and programme objectives and requirements" through the automatically-generated Unit Outline (p. 56). What was missing from the policy environment was Marshall's (2007) statement L1-1 "Learning objectives are linked explicitly throughout learning and assessment activities using consistent language" (p. 9).

A design principle was developed to explicitly display the mapping between learning outcomes, assessments and graduate attributes in a single table. This initiative was implemented in some of the units, but not all.

Scaffolding
The project intended to collate existing skill-scaffolding information from individual units into a centralised website, so that helpful information could be shared within the School. The idea was that tutors and unit coordinators could create new resources about common tasks (e.g., video editing, mind mapping, etc.) using a 'crowdsourcing' model. However, no progress was made on this because a suitable web hosting solution was not available within the university.

Modeling
Given that some of the new units were quite innovative, and students might find it difficult to know what was required of them, the design principles specified the provision of exemplars that 'modeled' the type of work students were expected to produce. Where assessments remained unchanged from 2013, model answers were provided. However, in units with new assessments, no model answers were available. In these units, exemplary student submissions were collected, for use as model answers in future study periods.

Guide for tutors

The design principles specified a guide for tutors that provided details of how to facilitate learning and how to mark student work consistently within each unit. This arose from observations in the Needs Analysis that too little information was provided to tutors and students about how to approach weekly topics. In the relatively small on-campus classes, lecturers could readily provide verbal information to address questions, but this was not the case in the OUA model. Therefore, the Guide for Tutors was proposed to make the implicit explicit.

A formal Guide for Tutors was only produced for one unit. However, this was not problematic, because the information available in the revised units was substantially greater than in previous versions, and OUA unit coordinators and tutors were able to address emergent issues effectively.

Blackboard template

The Needs Analysis identified that the Blackboard Learning Management System was used in a very clumsy way that required multiple clicks for students to access each piece of content. The graphic design was also unattractive. A new Blackboard template was developed, with new banners and icons.
The content structure was reorganised to minimise the use of folders (and remove any confusing 'description' text). Instead, content was presented on a single page, where feasible. Where sections of content were too long, a folder was used for that section. The revised structure enabled students to find what they needed in each unit with minimum mouse clicks, and, at the same time, see the content in context.

Two changes were made to enable students to more easily know what they needed to do during the unit. The first of these was a more detailed Program Calendar, which provided a tabular, weekly overview of the entire unit, with hot links to relevant topics and assessments. The second pedagogical change was to present the Assessments as a single page, with a table at the top which summarised all the assessments

Evaluation-research approach

This study addresses two evaluation-research questions.

- To what extent, did the design principles, as implemented, contribute to an effective, contemporary online e-learning environment?
- What aspects of the e-learning environment need to be improved?

This, largely formative, evaluation examines the roll-out in Study Period (SP) 1, 2014 of the first four CFY units. It considers the extent to which the design principles have been implemented, and how well they have worked for OUA students and tutors. The study investigated the processes involved in implementing the design

principles, and reports (above) on a desk audit which visited selected parts of each of the implemented Blackboard sites.

To guide interpretation of the findings, the broad characteristics of the four units studied are summarised in Table 1.

Table 1: Broad characteristics of the four Common First Year units.

Unit	Characteristics
ICT in Education	Authentic learning design with students developing artefacts for publishing on a blog, including a video production and a reflective essay.
Language and Literacy	Some aspects of an authentic learning design with students developing both their own personal literacy, and their understanding of multi-literacies, through a portfolio.
Child Development	A content-focused unit introducing students to the major theories of child development. Assessment is through online tests and a learning journal.
Performing Arts	Authentic learning design with students developing an ongoing portfolio of performing arts artefacts, including videos, songs and newsletters.

Method

Formative and summative feedback was sought from OUA students and tutors about pedagogical and technical aspects of the new unit designs. This was achieved through qualitative responses on the Blackboard discussion forum. A dedicated forum was set up for each of the tutorial groups for each of the four units running in Study Period 1, 2014. Because we were interested in feedback on the changes made, responses were only sought from students who had studied units in the earlier format. Those students were asked to respond to the following questions.

- What do you think of the new Blackboard interface? Is it more engaging? Are you able to get where you need to be with fewer clicks than before? What works well and what could be improved?
- What are your views about the way the content is organised on the Blackboard site? Is it easier for you to know what to do?
- How helpful do you find the video mini-lectures?
- Focusing on the broad, learning aspects of the unit, what works well and what could be improved?

An 'anonymous' option was provided, but used sparingly. There were 57 student responses and 25 tutor responses, although some were responses to earlier comments rather than direct answers to the questions posed. Approximately 60 pages of feedback was collated and organised into themes for each unit. Overarching themes across the units were then drawn together. Follow up emails to Unit Coordinators sought confirmation about particular issues.

Results

Overwhelmingly, students and tutors provided positive feedback about the new units. Students are finding the units *"fun"* and *"practical"*, and wish *"more units were like it"*. One student appreciated the *"balance of purposeful task, reflection and assessment activities"*, while another was already imagining *"how I can use all I've learnt in my classroom some day"*.

Some experienced students appreciated the changes compared to previous units. *"Finally it seems we are seeing what is being preached being put into practice."*

Students appreciated the move away from reliance on academic reading and writing, and the clarity of information provided. Tutors also expressed a view that the new units engaged students more.

The new Blackboard interface received strong acceptance from students and tutors. They found the interface easier to use; the colours and layout had improved; the left hand menu bar *"makes accessing the modules and topics a lot easier and quicker"*; and it takes fewer clicks to access tasks and materials. Student also appreciated the Topic Synopses, the new Assessments page layout, and the weekly 'flow of tasks'. Tutors reported fewer queries from students about finding relevant information. Despite the strong support for the new interface, the

clumsiness of the Discussion Board interface was repeatedly raised by students, as discussed below.

The mini-lecture vodcasts were very popular among students, for the range of reasons displayed in Table 2.

Table 2: Summary of perceived benefits of the vodcasts.

Benefits	Evidence
General	"These are hands down the best improvement this year! I can appreciate that they would take a significant amount of time to produce, but they are such a great way to synthesise and review information."
Concise overview	"I didn't have to find a huge amount of time to get an idea of what the week held for me."
Visual and auditory learners	"[As] a visual learner it has helped me to get a broader understanding of the topic prior to reading, watching videos and undertaking tasks. I have taken a lot of what has been said in these brief introductions and then applied it to my learning, giving me a much deeper clarification on the topic."
Increasing a sense of belonging	"As an online learner I really appreciate these mini lectures - to see a human!" "You feel like you are actually a Uni student"
Convenience	"Playing the audio in my car has really assisted in my understanding of the Unit (and [I've] learned quite a bit in the process)"
Reinforcement	"I could play them back to absorb information" "The short chunks allow students to grasp the key concepts"

Despite these positive findings, some shortcomings were noted in each of the four units, concerning, overlap between learning activities and assessment, student and staff workload, and appropriateness of assessment. These were largely teething problems which could be resolved relatively easily.

Overall areas for improvement

Several issues consistently arose across each of the four units evaluated. The most noteworthy of these concerned the clumsy and time-consuming nature of the Blackboard interface; and the design of learning activities that are appropriate for OUA students.

Discussion Board Interface

While significant issues also arose with respect to marking and group management in Blackboard, the major focus of this paper is on the Discussion Board interface. For many years, one of the major tools used in Learning Management Systems has been the discussion functionality (Collis, 1996; Harasim, et al., 1995; Salmon, 2003). In the School of Education, discussion forums underpin every unit offered online. However, this study identified significant inefficiencies in the way the Blackboard Discussion Board works, and these impact on the ability of students to interact with each other, and with the opportunity for tutors to facilitate learning in the time allocated for their work.

Students and tutors commented on the number of clicks needed to move from one discussion thread to another. In the current implementation, students click on a forum, then, after it loads, they click on a discussion thread. To go to another forum requires two clicks back, and then two clicks forward to the next thread. The continual clicking back and forward makes it difficult to return to a relevant post. Students report:

> I still find it difficult searching for information in the group discussion board. It is time consuming going in and out of threads looking for that little useful nugget of information.

One student suggested that the discussion forum functionality should work in the same way as many other 'forum' solutions:

It would also be time saving if it were possible to view all the posts of a topic on the Discussion Board at once without having to constantly go in and out of each post's thread.

Students also reported problems with searching and 'flagging' information, reductions in functionality with system upgrades and ongoing bugs in the system. In summary, the discussion forum environment at this university is inadequate for a contemporary online learning environment, and it is unproductive for tutors and students. The extent to which these issues are related to the Blackboard product itself, or the implementation at this university, is unclear.

Learning activity design

Both tutors and students expressed some concerns about the opportunities for collaboration and social learning in the four CFY units. Despite this being a desirable aim (Collis, 1996; Harasim, et al., 1995; Salmon, 2003), and a deficiency in the current learning designs, the scale of OUA units makes this problematic. OUA tutorial group sizes are initially 75, and, while they typically reduce over time due to attrition, they are still significantly larger than advisable for effective small-group online teaching. OUA tutors are also only paid for eight hours of online facilitation per week, and this mitigates against the design of engaging small-group activities, and makes it difficult for students to engage in meaningful discussion.

Various experiments are being pursued to establish smaller 'study groups' within larger groups, but, to date, these are not sustainable. The implementation of Blackboard at the university also imposes technical constraints on attempts to implement small-group learning activities.

Conclusion

The overall finding of this work is that the implementation of the four common first year units have occurred in broad alignment with the design principles, and the implementation of the design principles has led to an improved student experience. Most elements of the design principles have been implemented as planned in most units. There was substantial positive feedback from students and tutors about the c-MOC design, including the user interface, the organisation of information and content, and, particularly, the mini-lecture vodcasts. Nevertheless, some fruitful areas for improvement were also identified, and they are being addressed.

Two outcomes of the study, however, are not so easily resolved. The Blackboard product, or its implementation at the university, is not able to meet the needs of students and teachers in large units like those offered to OUA students. The functionality of discussion boards and group and marking management simply does not meet requirements, and students and tutors waste substantial amounts of time clicking between screens in the interface, rather than learning.While it is important to ensure that the system functions on a 24x7 basis, and can manage the load placed on it, it is also important to ensure that the system provides an efficient learning and teaching environment, where tutor and student time can be used effectively.

The second issue that needs ongoing work is in establishing meaningful opportunities for collaboration and social learning within the 'large group' OUA environment. Finally, this paper has presented some initial evidence that it is possible to design engaging online learning environments for large classes, which draw on both the historical principles of educational technology and emerging approaches, such as mini-lecture vodcasts.

Acknowledgments

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Please cite as: Phillips, R. (2014). Design principles for Massive Online Courses: examples from first year teacher education. In B. Hegarty, J. McDonald, & S.-K. Loke (Eds.), *Rhetoric and Reality: Critical perspectives on educational technology. Proceedings ascilite Dunedin 2014* (pp. 312-319).