Designing online delivery through educational design research

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This paper reports on an early-stage educational design research project to develop scalable online delivery at a higher education institution with relatively low maturity with digital learning. This involves not only an intervention aimed at transforming the curriculum and teaching practices, but also considers the broader set of institutional services that support students and faculty. The paper introduces the substantive problem in context, reviews existing design principles in the literature on high-quality online delivery and provides an overview of the emerging intervention design. This 'whole-of-institution' scope is fairly novel for educational design research, and the paper closes with a reflective analysis of using educational design research for this type of project.

Keywords: Educational design research; Design-based research; Online learning

Introduction

Two key trends in higher education are the ongoing growth in student demand for online and blended modes of delivery (Norton & Cakitaki, 2016), and digital transformation of institutions and pedagogies (e.g. Adams Becker *et al*., 2017). Institutions that are not engaged with these trends are at risk of being left behind, however the transition from traditional on-campus teaching to contemporary technology-enabled practices is often challenging (Salmon, 2005). This paper describes an early-stage educational design research project to develop scalable online delivery at an Australian non-university higher education provider that currently has a very small online student cohort and relatively low maturity with digital learning. The project is intended to build digital capabilities within the institution and launch a high-quality online mode of delivery for a postgraduate course. This paper aligns with Killen, Beetham and Knight's (2017) definition of digital capability as "extent to which culture, policies and infrastructure of an organization enable and support digital practices".

Contributions are made in two areas. First, a set of design principles from the literature are identified to guide the design and implementation of high-quality online delivery. These design principles are drawn from several papers and reports that provide guidelines, principles or recommendations for designing online delivery (Bailey *et al*., 2018; Collis & Moonen, 2002; Singh & Hardaker, 2014; Stone, 2017). Second, educational design research has mainly been used in smaller-scale interventions (Anderson & Schattuck, 2012) and this project is an opportunity to examine the approach as a technique for projects that involve a whole-of-institution intervention. As an early-stage project, this paper focusses on the analysis/exploration stage of educational design research (McKenney & Reeves, 2012) with some design/construction and reflection also discussed.

Educational design research

Educational design research (EDR) is "a genre of research in which the iterative development of solutions (e.g. educational products, processes, programs or policies) to practical and complex educational problems, provides the setting for scientific inquiry, and yields new knowledge that can inform the work of others" (McKenny & Reeves, 2014, p.132). It was popularised in the early 2000's (e.g. Design-Based Research Collective, 2003; Barab & Squire, 2004), and since then has seen use in a broad range of contexts and disciplines. It is part of a family of design-oriented approaches, including design-based research (Design-Based Research Collective, 2003). Educational design research has mostly been used in relatively small contexts, with fewer studies into interventions that impact a whole institution or the sector (Anderson & Schattuck, 2012).

A generic framework has been proposed by McKenny & Reeves (2012), with three stages towards a maturing intervention and increased theoretical understanding: Analysis/Exploration, Design/Construction, and Evaluation/Reflection. Anderson & Schattuck (2012) propose that quality educational design research is characterized by: being situated in a real educational context; focusing on the design and testing of a significant intervention through a collaborative partnership between researchers and practitioners; using mixed methods; and involving multiple iterations with an evolution of design principles.

In this project, the educational design research approach is adopted to increase likelihood of success by drawing on existing knowledge on high-quality online delivery and incorporating a strong evaluation/improvement cycle. It also facilitates dissemination of outcomes and design principles.

Below, the description of the project is divided into the core elements of educational design research suggested by Barab (2014). The *naturalistic context* and *problem* are combined to provide a contextualized discussion of the problem; *theory* is based on existing design principles identified in the literature (Reeves, 2006); followed by a description of the intervention *design*.

Substantive problem: Launch high quality and scalable online delivery

While the uptake of online learning is increasing, institutions often start embracing digital learning through substitution rather than making use of the more transformational opportunities of technology (Salmon, 2005). In contrast, this project aims to transition a non-university higher education provider with low levels of digital maturity to more contemporary and digitally-enabled approaches of teaching and learning. The institution has around 1000 students across two campuses, with undergraduate and postgraduate courses in project management, business, and information technology. There is a small cohort of students studying online, with no further intakes planned until online delivery is overhauled. Teaching practices are fairly traditional, with class time split between a lecture and a more active tutorial. Students can get lecture slides via the learning management system LMS, and also submit assignments via Turnitin. A strategic decision has been made to overhaul and relaunch the online delivery, both for growth in student numbers as well as to build digital capability within the institution to prepare for the future of education. The online delivery will delivered fully online and will be designed so that a reasonable increase in number of students and courses can be handled without greatly changing technologies or workflows.

The problem, then, is to develop and launch scalable and high-quality online delivery in an institution with mostly on-campus delivery and services, and relatively low digital maturity. Table 1 describes the context with reference to Collis & Moonen's (2002) four components of flexible learning.

Table 1: Institution context – current state and future vision

	Current state in institution	Vision and plans for institution
Institution	• International students on-campus, small cohort of online students. • New senior leadership team. • Some student services have online access arranged as-needed.	• Online delivery to be considered as 'core business' within the institution. • Regular online student intakes, scaling up with accreditation cycle. • Renewed emphasis on quality.
Implementation	• Period of curriculum renewal through the reaccreditation cycle. • Some experimentation led by lecturers.	• Rolling out online delivery is a major initiative for the institution.
Pedagogy	• Relatively traditional model with most interaction occurring through lectures and tutorials. Slides provided online.	• New curriculum model based on transformational learning (Slavich & Zimbardo, 2012).
Technology	• Core technologies: learning management system, text matching. • Slides and assignments submissions through LMS. Forums and online quizzes used in some classes.	• Scalable suite of learning and teaching technologies that meet needs of students and the desired pedagogy.

Theory: Design principles for designing online delivery

A substantial body of knowledge exists on what has (and hasn't) been effective for online learning. To guide the intervention, a set of design principles for developing online delivery has been identified by reviewing key papers and reports that provide guidelines, principles or recommendations for designing online delivery (Bailey *et al.*, 2018; Collis & Moonen, 2002; Singh & Hardaker, 2014; Stone, 2017). These papers were selected based on their provision of a set of evidence-based design principles about components of online learning, that with appropriate granularity to help shape the project intervention design.

These papers were mapped against Collis & Moonen's (2002) four components of flexible learning: institution, implementation, pedagogy, and technology. Two papers focused mostly on specific components of flexible learning, while the other two were broader in scope. Through this process, the emphasis on the need for high levels of embedded student support was noted in Stone (2017). To reflect the embedded nature of student support, the pedagogy component has been re-defined to include not just the instructor but also the broader network of student support that is provided to a current student, such as personalised early intervention. In addition, the institutional curriculum model based on Transformational Teaching (Slavich & Zimbardo, 2012) provides more detailed guidance on teaching methods.

Table 2: Design principles for developing high-quality online delivery

	Synthesised design principles
Institution	• Identify specific goals with a simplified approach to measuring progress or outcomes (Collis & Moonen, 2002) • Know who the students are (Stone, 2017) • Use different delivery configurations for different student groups (strategic portfolio) – institutional focus on prioritizing students' needs (Bailey *et al*., 2018) • Develop, implement and regularly review institution-wide quality standards for delivery of online education (Stone, 2017) • Take a long-term view for resourcing and infrastructure, using vendors for innovation where necessary (Bailey *et al*., 2018; Collis & Moonen, 2002)
Imple-mentation	• Engage faculty as partners and leaders, from strategy development to new methods of teaching and learning (Collis & Moonen, 2002; Singh & Hardekar, 2014) • Equip faculty for success, with just-in-time support, flexible frameworks, and capabilities and expertise to design for quality (Bailey *et al*., 2018; Collis & Moonen, 2002; Singh & Hardekar, 2014) • Align strategic initiatives with the "cultural configuration" of the institution to encourage diffusion of innovations (Singh & Hardekar, 2014) • Clear vision and communication of strategy, alongside an evolving road map (Collis & Moonen, 2002; Singh & Hardekar, 2014) • Don't try to change too much at the same time (Collis & Moonen, 2002) • Leaders should role model use of eLearning systems (Singh & Hardekar, 2014)
Pedagogy	• Intervene early around student expectations, skills and engagement (Stone, 2017) • Value and support 'teacher-presence' (Collis & Moonen, 2002; Stone, 2017) • Design for online, focussing on an inclusive, engaging and flexible learning environment (Bailey *et al*., 2018; Collis & Moonen, 2002; Stone, 2017) • Collaborate for holistic, integrated and embedded student support (Stone, 2017) • Use learning analytics to target and personalise student interventions, and contact and communicate throughout the student journey (Bailey *et al*., 2018; Stone, 2017)
Technology	• Adopt core and complementary technologies, and focus on adoption (Collis & Moonen, 2002) • Offer flexibility and choice, but don't overload (Collis & Moonen, 2002)

Design: Project description (a prototyping approach)

Developing and launching online delivery within an institution is a significant undertaking that requires work across the whole institution. At the core of the project design is a series of iterations, which help break up the work into more manageable pieces as well as align the project with an education design research approach. These iterations operate at two levels. The online units can be evaluated in each study period and improvements identified (a more granular level of analysis). As well, the institution is in a period of curriculum renewal and so there are opportunities to run three phases of iterations that have a broader scope and unit of analysis. This allows more transformational changes to be implemented and evaluated through the broad project phases, while also allowing smaller changes to be made and evaluated in each unit within a project phase. These design iterations are planned across three partly concurrent phases.

Phase 1: minor improvements to current delivery. Collaboration is being undertaken with the lecturers in each upcoming online unit to iteratively improve delivery and incorporate elements of the new curriculum model. Initiatives that have been taken already include improving teacher presence through welcome videos, swapping to a more reliable virtual classroom system, supporting a lecturer to do an improvement they are interested in (i.e. using an online rubric for marking), and strengthening the data collection and evaluation cycle.

Phase 2: Live prototype of new approach. The online delivery will be overhauled using the currently accredited course and relaunched at a small scale. This involves a whole-of-institution approach to implement effective and integrated service provision to the online students as well as start to embed the notion of online delivery as core business to the institution. The design principles will be used to guide the project development, although it is expected that some will only be partially achieved at this stage. Project development work includes:

- Institution: new student market, cohort model for admissions, online provision of support services to teachers (e.g. professional development; educational design support; induction; technical support) and students (e.g. orientation, out of hours technical support); new quality frameworks;
- Implementation: aligning changes and planning with the reaccreditation course advisory committee, building capability and new support services for teachers (e.g. professional development; educational design support);
- Pedagogy: aligning curriculum, assessment and teaching with the new curriculum model, with guidance from the design principles; developing an embedded approach to academic support and pastoral care; and
- Technology: expanding the suite of core and complementary learning technologies.

Phase 3: Scalable online delivery. Once reaccredited, the postgraduate course will be launched via online delivery (as well as an on-campus/blended mode) in a scalable manner that could be replicated for other courses. The model for online delivery will be informed by the outcomes and evaluation of the live prototype in the previous phase. Preparations for this are being done through standard academic processes, starting with the new curriculum model and the Course Advisory Committee for the course reaccreditation. Aligning this phase with the course renewal provides an opportunity to embed the design principles into the course design.

Additionally, work is being done to develop the general digital capability of the institution, including management modelling use of new technologies and encouraging academic staff to incorporate these technologies into their work practice. For example, the institution has multiple campuses so the virtual classrooms tool is being promoted as a way for academics to engage in cross-campus collaboration.

Reflections on designing online delivery through educational design research

While it is too early in this project to evaluate and analyse outcomes, there are some observations that can be made on the use of educational design research on an intervention that targets whole-of-institution changes.

1. The educational design research approach of iterative development appears to align well with large scale changes of this nature. As argued by Coughlin, Suri and Canales (2007), prototypes can assist organisational change by giving staff permission to explore new behaviours and potentially 'fail' in small, low-impact ways, while also providing something tangible that people can perceive and play with.
2. The institutional context has heavily shaped the design of the project iterations, particularly the course reaccreditation timeframe. In turn, the project has raised issues for consideration within the course advisory committee. It is expected that the institution's business environment or plans may change during the project which would require reconfiguration of the iterations.
3. The intervention within this project operates at two levels, outcomes and process. There is a direct intervention into the design of the existing units (Phase 1) that has an immediate focus on student outcomes. However, in Phases 2 & 3 the object of the intervention is to design a process (i.e. planning a whole-of-institution project). This adds complexity to the educational design research process, as the design principles are at a high-level with less guidance on granular decisions such as teaching techniques to adopt.
4. Evaluation and reflection can be directed at both outcome and process, while also considering the interplay between these aspects. Good quality educational design research requires linking processes of enactment to outcomes (Design-Based Research Collective, 2003) in a rigourous way (which Barab (2014, p.157) describes as "principled accounts that provide logical chains of reasoning and prove useful to others"). Doing this well across multiple levels of intervention is likely to be challenging, and possibly only a subset of the design principles will be able to the meaningfully evaluated and extended.
5. Comparing the design principles against the institutional situation highlighted one substantial gap in the technology component. Additional learning technologies are needed to enable scalable and high-quality online delivery, and this poses the question of how to architect the suite of learning technologies to enable the sophisticated approaches specified in the design principles. The literature on aligning technology affordances with pedagogical approaches is generally too granular for enterprise systems selection decisions. Drawing on IT portfolio approaches (e.g. Maizlish & Handler, 2006) to align the suite of systems to business strategy and requirements may provide a more useful set of techniques.

Next steps

The project will follow the phases described above: (1) introduce new techniques to the existing online delivery, and review the LMS and online tutorial system; (2) initiate a whole-of-institution project to prepare for the new online delivery, with four work streams: educational design and delivery, integrated student support services, administration for student and term lifecycles, and marketing; and (3) embed online delivery as core to the postgraduate program as it goes through the reaccreditation design process.

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