reconnect

Reconnecting relationships through technology

Co-creating a digital learning innovation framework through design thinking approaches

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Although *innovation* is widely used as a marker of excellence by universities it remains a poorly conceptualised idea, particularly in the realm of teaching and learning. In this paper, we describe an institution-wide project to co-create a Digital Learning Innovation Framework at a large Australian university. Through design thinking approaches a central learning and teaching unit led a co-design process to investigate and define digital learning innovation within their institutional context. This initiative involved a total of 114 stakeholders who design and deliver digital learning innovations at the University. This paper reports on a tentative, working definition of digital learning innovation and six guiding principles that arose out of this Digital Learning Innovation Framework co-design process. In this way, this paper makes significant contributions in conceptualising and contextualising practice-based innovation for digital education. Future implications and limitations of this study are also noted.

Keywords: innovation, digital learning, design thinking, higher education

Introduction

The COVID-19 pandemic accelerated digitisation in every sector of education. The speed at which higher education had to adapt its strategy and practice highlighted the importance of agile innovation as a key characteristic of sustainable business models for contemporary universities. However, although the term is used extensively by universities, precisely what is meant by *innovation* in the higher education context remains unclear and under-investigated (Barger et al. 2021; Edwards-Schachter 2018; Hall & Lulich. 2021; Sanjay & Aggarwal 2021).

A survey of publicly-available digital learning or technology strategy documents from 71 top universities found that innovation was a core concept in most of these documents (Falvin & Quintero 2020). However, the authors concluded: "the innovation proposed is frequently modest, centring on more efficient operation and incremental improvement. Universities declare themselves to be innovative, but…analysis shows their conception of innovation to be, paradoxically, conservative" (Falvin & Quintero 2020, p. 482). This finding is echoed by a more recent study of 52 highly ranked American universities' strategic documents (Hall & Lulich 2021) which concluded that "though universities are recognizing the value of novel change, their plans, with few exceptions, do not express visions of bold initiatives, restructuring or 'disruptive innovation'" (p.21). Further, Johnson (2018) has argued that innovation is often deployed by universities primarily as a symbolic, rhetorical strategy that results in little material change. He claims that in a sector driven by prestige and rankings, a public-facing innovation agenda builds an institution's symbolic capital often irrespective of the results of their publicly-promoted innovations.

In a review of literature on innovation and entrepreneurship in an academic context, Schmitz et al. (2017) note the fragmented nature of the literature and the lack of a systematic approach to understanding the nature and process of innovation in higher education despite the proliferation of the term's use and importance. They specifically note the need for closer analysis of "academic innovation" relating to the teaching mission of universities (Schmitz et al. 2017, p. 385). Ellis and Goodyear (2019) have also highlighted the importance of universities developing an innovation framework to guide teaching and learning development. Their interviews with 54 senior Australian university leaders (DVCE and equivalents) identified balancing innovation and quality assurance as a key tension. They conclude:

> In the current higher-education climate, focusing on both quality and innovation is essential…but considerable work needs to be undertaken to make it clear how quality and innovation can

> integrate strategically and effectively…there seems to be a better grasp of what a quality framework involves for course development and the student experience, but there is some uncertainty about how an accompanying innovation framework is best structured and integrated. The challenge for an integrated innovation framework lies somewhere in the space between encouraging creativity and risk-taking, while at the same time not undermining a systemic approach to standards. (Ellis & Goodyear 2019, p.68)

The current study reports on the development of a Digital Learning Innovation Framework (DLIF) at Deakin University a large Australian multi-campus university. It describes our practice-based methodology and offers a working definition of digital learning innovation with six guiding principles. This paper makes two significant contributions to the existing literature. First, we describe a bottom-up co-design process which captures cross-disciplinary insights into practice-based innovation within a higher education context. Second, this paper contributes to the conceptualisation of practical innovation processes which have been surprisingly under-theorised in the higher education literature. These insights will be relevant to both those teaching and learning leaders building symbolic capital through innovation projects (top-down processes), and those implementing pragmatic processes to enact digital learning change (bottom-up processes).

Innovation in (digital) learning and teaching

Kim and Maloney (2020) have recently argued in a book-length study that *learning innovation* is an emerging interdisciplinary academic field and should be recognised as such. They argue that despite a detailed understanding, from decades of learning science research, of how learning works, there is much less clarity on how to manage effective change that aligns teaching and learning practice within higher education institutions with this research. They suggest that a new field of learning innovation would match the "growing body of scholarly and popular literature on how people learn" with "a parallel scholarship on how universities advance learning" (p.5). They define learning innovation as:

> The interplay between the complex set of practices, methods, and designs that are part of the attempts by higher education to improve teaching and student learning. The practices not only bring together learning science, applied educational technologies, and learning analytics, but they do so within the framework of the institutional structures, policies, investments, and strategic leadership that enable this work… when we use the word "innovation," we mean an intentional and aspirational investment in change to improve practices. These practices occur along a continuum from individual faculty transformations to institutional reforms. (Kim and Maloney 2020, p.6)

Kim and Maloney lead teaching and learning centres at two large US universities (Georgetown & Dartmouth) and their analysis draws on case studies of similar learning innovation hubs across the US. They argue that the work of such centres and a range of institutionally-supported innovation programs marks a "turn to learning" and they speculate that these programs have "brought more change to teaching and learning in the last seven years than perhaps the previous seventy" (p.9). However, they fear that this momentum cannot be sustained without deeper more coordinated scholarship and the development of a "shared language of inquiry"(p.103).

In the Australian higher education context, a national teaching and learning grants program from the Office of Learning and Teaching (OLT) and its predecessors (2004-2016) encouraged an integrated scholarship around teaching and learning change projects. Gannaway et al. (2013) outline a range of studies commissioned by OLT and its predecessors which sought to consolidate a framework for embedding, sustaining and upscaling innovation practices that arose from funded projects. Crucial to this framework is a conceptualisation of dissemination as an engagement process at the heart of change/innovation projects rather than as a final stage of adoption or diffusion in a traditional linear model (cf. Rogers 1976).

The traditional diffusion model is ubiquitous in innovation studies and has been used extensively in the field of technology enhanced learning. Liu et al. (2020), in their systematic review of the adoption of learning technologies note that this focus on standard models of adoption and diffusion is underpinned by three problematic assumptions: "adoption is invariably positive; technologies are fixed, and; adoption is binary" (p.10). They suggest that these assumptions shape practice in several ways. Firstly, "conceiving non-adoption as failure… miss[es] insights into the positive motivators, decision making and behaviours of those who do not utilise learning technologies in the way that others think they should" (p.10). Secondly by focusing on technology as fixed there is a lack of understanding of the ways academic adopters might shape the technology to better fit their practice. They argue that, unlike other sectors, there is a lack of research around innovation and co-creation in the studies of technology enhanced learning adoption. Finally, by focusing on adoption as an end

point many studies assume positive impact comes immediately with adoption rather than through iterations and adaptation over time.

These problematic assumptions often influence conceptions of academic innovation. As Barger et al. (2021) found, in a recent study on academic innovation through the examination of twenty US-based university websites, "academic innovation research and popular writing often present an overlap with educational technology, digital innovations, or eLearning in general" (p, 3). This results in what they term a "blurred line between academic innovation and educational technology" innovation.

Karen Smith (2012) who provides one of the only semi-systematic reviews of the literature to focus specifically on teaching and learning innovation, also emphasises the complexity of the diffusion/adoption processes. In a detailed review of 89 studies, which included a broad range of technology-adoption as well as policy, people and curriculum change projects, she identifies six key lessons from the literature which guide innovative practice:

- **"Senior staff need to support an innovation for it to spread effectively":** this includes creating an "institutional discourse" (Smith 2012, p.174) for projects that sets out a shared vision; ensuring that effective planning is in place for the continuity and sustainability of the project beyond launch or pilot; ensuring the policy framework delivers an integrated support mechanism for a given project and ensuring reward and recognition frameworks value participation and innovation.
- **"Innovation is time consuming and takes time to embed":** "Time was highlighted as the major barrier to adopting innovative work practices." (Smith 2012, p.175); therefore, effective workload allocation needs to be given to enable academic participation in innovation projects. Given both the complexity of change and the often-limited availability of resources, a carefully planned series of small iterative changes over time may work better than "big-bang" implementations.
- **"Staff and students must be adequately skilled to engage with the innovative practice":** this is often best achieved through building a community of active learners that provide "situated staff development, where projects and project teams provide authentic staff development opportunities." (Smith 2012, p.176). Capability development pays long-term dividends given that staff who have previously experienced innovation are more likely to respond positively to future projects.
- **"Innovations that sit well within a specific context spread better":** successful innovations address a real perceived need in a particular academic or disciplinary context. Finding ways to "situate the innovation within the individual's own practice" (Smith 2012, p.176) can be achieved by involving academics in pilots or evaluation projects; this allows a "believable picture" (Smith 2012, p.177) of the innovation to be built up by academics in the context of their own teaching and learning practice.
- **"Supportive networks can facilitate the diffusion of innovative practices":** communities of practice and partnership approaches which gather interdisciplinary teams to work on innovation foster "ownership of the materials and subsequent changes in practice" (Smith 2012, p.177); collaborative partnerships between central learning and teaching units and disciplinary experts can work well especially where they are developed over time; peer pressure from colleagues and other institutions can be leveraged especially in the early stages of an innovation project.
- **"Institutional infrastructure needs to be in place to support the innovation":** this includes technology infrastructure, but also other types of infrastructure such as project planning and communication strategy as "issues can arise if innovative solutions are not portable" (Smith 2012, p.178).

Smith's study highlights the complexity of innovation processes and confirms Kim and Maloney's (2020) contention that teaching and learning innovation is a process which requires multidisciplinary skills that marry an understanding of how people learn and of how institutions might adapt to change. We will return to Smith's work later, where a useful comparison can be made with our analysis. We have deliberately framed the work that follows as "digital learning innovation" rather than academic innovation or learning innovation. While we acknowledge the conceptual issues in the literature, and the "blurred line between academic innovation and educational technology" (Barger et al 2021), our previous research and practice, which we describe briefly below, has led us to conceptualise the relationship as a productive "entanglement" (Fawns 2022) rather than as a binary or melding.

Methods and Study Context

Study Context

The current case study of the development of a Digital Learning Innovation Framework (DLIF) comes from a university with a history of innovative practice, a reputation for innovation and one that consciously deploys that

symbolic rhetoric to enhance its standing (Johnson et al 2022). Deakin university has been a pioneer in a number of significant projects such as the use of artificial intelligence to improve student services through a partnership with IBM Watson; the University's mobile app, which pioneered chatbot technology in the sector; the introduction of microcredential-based Masters degrees; and the production of a suite of postgraduate degrees on a MOOC platform (O'Donnell & Schulz 2020). The development of the DLIF was therefore born out of an existing commitment to innovation practice in a range of curriculum, student engagement, and technology projects rather than an abstract desire to initiate a culture of innovation. However, as teaching and learning leaders, we were acutely aware that signature projects alone do not necessarily result in a sustained culture of innovation or cultivate a practice of innovation. We therefore set out to create an infrastructure that could support the translation of innovation rhetoric and strategy into practical application across a range of small, medium and large-scale digital learning innovation projects at the University.

The DLIF was also developed in an environment where we had used a range of iterative design processes and frameworks across our signature innovation projects. We have previously described our approach to these iterative design processes as "Degree Design Thinking" (Adachi & O'Donnell 2019). This approach to institution-wide curriculum innovation and renewal projects takes a broad view of design thinking, as adopted by large-scale infrastructure programs to address "wicked problems" such as the redesign of national mental health systems (Dorst 2019). In reviewing this extended approach to design thinking methodology, Dorst suggests it is a move from a focus on a discrete design project to conceptualising a "design-driven program of activities" that entails "a multi-year approach, comprised of sub-projects in which multiple stakeholders have roles that vary over time" (Dorst 2019, p. 124). Design thinking like other practice-oriented approaches to research such as educational design research is one where "research and practice can become intertwined" (Amiel & Reeves 2008 p. 37).

Our Degree Design Thinking model had two important elements which influenced our approach to the development of the Digital Learning Innovation Framework. First, whereas curriculum renewal has traditionally focused almost exclusively on learning design, our Degree Design Thinking approach integrates design activity across four interrelated dimensions: *portfolio design* (the mix of courses, pathways and macro and micro-credentials); *team design* (effective work practices and collaboration); *learning design* (task-based social learning and authentic assessment) and *service design* (student-journey driven approach to a seamless user experience). Second, each design layer uses different designerly ways of working that include: *design thinking* – an overarching approach focusing on iterative user-centered processes; *design patterns* – which identifies and maps replicable interactions; and *design tools* – a broad set of techniques that enable and model work practices.

Our approach to the development of the Digital Learning Innovation Framework needed to similarly allow for innovation across a broad *portfolio* of digital learning products, enable collaboration across diverse *teams* and focus on creating a tight interaction between *service design* and *learning design*. Its outputs need to include a mix of *design approaches*, mapping *high level patterns* as well as developing a set of *tools for implementation.*

Design Sprints as co-creation

The DLIF project, coordinated by the University's central teaching and learning unit, brought together diverse stakeholders from across the institution to share their experience and expertise of designing and delivering innovation in digital learning. The project drew on design thinking and design sprint methodologies (Knapp et al., 2016; Mendonça de Sá Araújo et al., 2019). A design sprint is an intensive process which allows for the application of design thinking in a condensed, pre-determined amount of time, often one week (Mendonça de Sá Araújo et al., 2019). While less intensive than the standard one-week design sprint, our project imposed a design of three three-hour workshops with each workshop scheduled three months apart. The workshop series was designed to lead participants through a process of generating insights into the current innovation journey at the university and ideas for how that might be improved; refining and testing those ideas; and planning for the implementation of successful solutions. A design challenge was posed to position all participants as active contributors and co-creators, and workshops were facilitated by an external Strategy Consultant with expertise in User Experience design to ensure impartial arbitration of decisions throughout the co-design workshops.

The workshops centred on the design challenge: 'How might we help our people deliver student-centred digital learning innovation?' The first workshop ('The blueprint'), held in December 2019, focused on mapping the innovation journey in its current state to build a common understanding of current processes, and identify characteristics of innovators, and the barriers ('pain points') and enablers ('gain points') in their journey. The second workshop ('Build'), held in February 2020, was designed to elicit underlying principles for enabling, and

reducing barriers to, digital learning innovation, and to create prototypes for structures or resources to support innovation. A third workshop ('Beta'), scheduled in June 2020, was planned to demonstrate and test prototypes, finalise the DLIF components and develop a plan for implementation and iteration (Figure 1). This final workshop was cancelled due to COVID-19 restrictions. Workshops were scheduled at three-month intervals, with discussion and ideas-sharing between workshops enabled by Microsoft Teams.
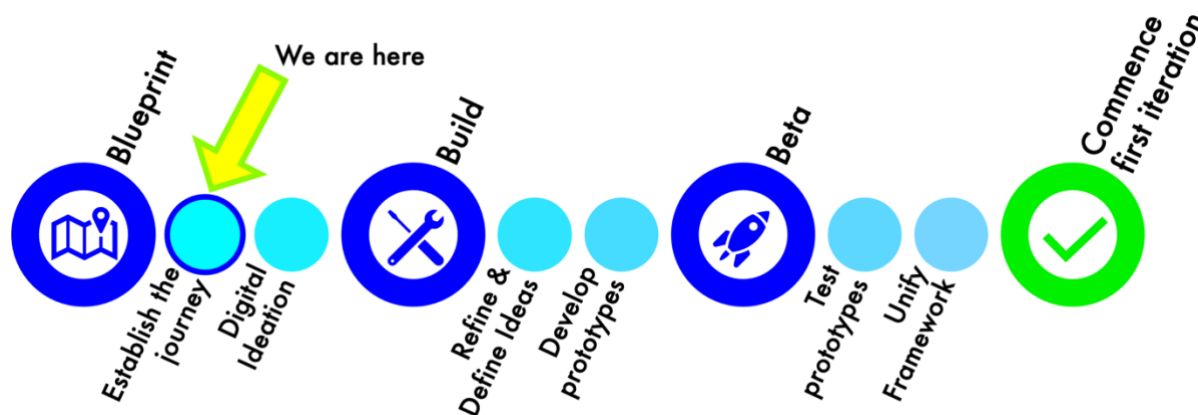
Figure 1: The series of three workshops (Blueprint; Build; Beta) modelled on Design Sprint methodology.

Workshop activities included small-group activities to provide all participants with an opportunity to share their experience of innovation at the University; individual reflections on what was 'seen, thought, felt, said and done' at five key stages of the innovation lifecycle (Inception, Initiation, Development, Implement, Sustain); group mapping of smaller steps and processes within those stages; brainstorming and refining principles; proposing ideas for enabling structures and resources; and working in teams to prototype new innovation processes. Due to the pandemic, and the consequent shifting priorities and requirement for staff and the University, the third workshop, scheduled for June, was postponed.

A total of 114 staff from across the University, including teaching academics, academic developers, learning designers, learning technologists, IT service technicians, solution architects, librarians, academic skills and language advisers and policy administrators, participated in the project over the first two workshops. This diversity of staff roles and experience meant that the full spectrum of academic innovation from those leading technology-focused changes through to those developing new styles of curriculum and assessment were represented. This also ensured capturing a wide range of experiences, perceptions and suggestions, and the identification of a range of potential solutions to the problem (Dorst, 2019; Mendonça de Sá Araújo et al., 2019). Further, the involvement of all participants in the DLIF creation process allowed for the testing and refinement of principles, ideas and prototypes by those who would use them and for whom they were designed.

Consolidating the Framework
Following the cancellation of the final workshop (due to pandemic restrictions), the project team, namely the three authors of this paper, undertook the tasks of finalising and refining the components of the Framework using the artefacts produced during the first two workshops. This paper reports on the first stage of this process which identified six principles of digital learning innovation and a working definition. These principles, together with other elements such as a detailed version of the Innovation Lifecycle Map and a set of templates for use by projects, will form the final Digital Learning Innovation Framework.

To arrive at the six principles and definition reported on here, the project team analysed material generated by participants throughout the two workshops. To conduct this analysis, an exemption from ethics review, based on the use of existing, non-identifiable data with negligible risk, was granted by the University Human Research Ethics Committee (2020-287). The first workshop artefact analysed was a list of characteristics of a successful innovator (characterised as 'Indy') generated through group brainstorming activities. The second was a list of 38 principles for successful innovation, again generated through a group brainstorming activity following discussion by participants in structured small group activities. The use of a collaborative, appreciative inquiry approach (Whitney & Cooperrider 2011) to generating these lists of characteristics and principles allowed for clarification of meaning and phrasing, and some preliminary grouping into common themes through the combination of similar or aligned suggestions. The principles were divided, by the workshop group, into 25 General Principles (GP) that applied broadly and 13 Contextual Principles (CP) that applied to more specific areas or circumstances; they are identified as such in the analysis below and when referred to in the discussion.

The third and final artefact generated from the workshops was a list of pain points and gain points associated with each stage of the innovation lifecycle. In small groups, participants identified smaller steps or sub-stages within each stage of the innovation lifecycle (i.e., Inception, Initiation, Development, Implement, Sustain). Individual participants then added experienced or presumed pain or gain points to the various steps or sub-stages across the entire innovation lifecycle.

The analysis of these artefacts was undertaken in two stages. First, the authors independently coded the 38 principles for successful innovation into emerging themes. This was followed by comparison of the emergent themes and groupings, and discussion to reach consensus across the authors. These thematic groupings were then compared with data from the other artifacts to confirm their salience as significant factors across the innovation process. This led to a vigorous discussion in proposing a definition of digital learning innovation, which coupled ideas from those design thinking workshops with our synthesis of existing literature.

In the following section, we discuss the six principles identified through our analysis and then compare these principles to those previously identified in the literature by Smith (2012), in order to propose a working definition of digital learning innovation.

Six principles of digital learning innovation

Principle 1: Create a safe place for new ideas
Our participants consistently identified that innovation demands radical intent, requiring actors to "be bold" and 'be open-minded' as they push boundaries and test out new and big ideas (General Principle/GP 1 & 2). In order to innovate, actors need to draw on courage and resilience to deal with, at times inevitable, failure and always-present uncertainty, as they reach into new territory. As Ellis & Goodyear (2019) identified, this is a challenging element as adherence to legislated standards often serves to make higher education institutions risk averse. Innovation therefore requires 'different types of thinking (GP7)' – both convergent and divergent thinking – to challenge the status quo: 'just because we have always done it one way it doesn't mean we shouldn't change (GP22)'.

However, participants recognised the environmental tensions and discussed creating a safe space where those courageous and risky activities can be carefully tested – 'Have a safe place for unsafe ideas: find places where you can take risks and push boundaries (Contextual Principle/CP 12)'. Workshop participants used the rhetoric of the 'sandbox' to draw out the nature of these "safe spaces". In most Learning Management Systems (LMS)for instance, there are 'sandbox sites' where teaching teams mock up samples for new teaching practices and experiment with new tools and designs. These sandboxes provide a safe experimental space where new prototypes can be tested to evaluate and iterate on ideas, without real risks, using a variety of "designerly" processes (Dorst 2019).

Principle 2: Keep focused on your purpose
In bringing about innovation and change, the ability to paint a clear picture of value and impact - in short, purpose - is a must, particularly for those leading innovation projects (Gannaway et al. 2013) – 'Be driven by value & impact (GP4)'. It is therefore critical both to set clear goals that build a narrative of the value added by the proposed change, and to assess the generated benefits at different stages of the project – 'Continuously check your benefit (GP14)'. In doing so, participants discussed the importance of consulting multiple forms of data and evidence, so that innovation is evidence-based and feedback-informed – 'Be data driven (GP21)' and 'Take on reflections and feedback (GP12)'. Participants saw innovation as a mindful and reflective practice of proactively seeking evidence for incremental improvements throughout a project, not a practice focused merely on evaluating a final impact. Using this feedback and evaluative evidence can also further build the purpose narrative articulating multiple levels of 'why' for a particular innovation – i.e., rationale for the institution (macro), for unit/course teams (meso) and for individual teachers and students (micro).

For instance, universities face criticism that some digital learning innovation projects can involve top-down imposition of a new technology across the institution. A classic example is the implementation of a new LMS, which constitutes the core digital learning environment for online learning and teaching at universities. Successful implementations are likely to be accompanied by a clear narrative of the pedagogical reasons for such big change, rather than a simple claim for automation and cost-saving through new technology. Similarly, implementation of such changes should include "a rollout plan, training plan, support needs and methods to obtain faculty buy-in" (Rucker & Frass, 2017 p.274). This highlights the need for a comprehensive framework underpinned by strong rationale and purpose.

Principle 3: Keep focused on your users
In design thinking approaches, co-creating solutions with users is common practice (Razzouk & Shute 2012). Our workshop participants also talked about the usefulness of this approach – 'Be customer (student) focused (GP3)'. Within the context of digital learning innovation projects in university settings, our users are students and/or academics who are the intended beneficiaries of improved practices and new applications. These co-creation processes driven by user/student/staff- centred approaches can then evoke meaningful communication and engagement throughout the innovation project lifecycle.

Any innovation project involves change in practice, process or product; thus communication and change management are key ingredients in successful innovation (Kotter 2008). In his classic work on innovation dissemination, Rogers (2010) argues that communication channels, which ensure that critical information is passed from one organisational unit to another, are one of five key elements affecting the diffusion of innovation People experiencing change need to obtain the right information in a timely manner to make sense of what is going to happen to them and to successfully adopt, and adapt to, the change. Our participants talked about the importance of embedding communication and engagement throughout innovation projects, at multiple stages and for multiple purposes: 'constructing the right story for the audience and claiming the story for implementation (CP5)' with a clear statement of what the success of this innovation looks like – namely, 'giving visibility to your innovation (CP11)'.

Sustained co-creation with users is difficult and this returns to the need to 'be open-minded' (GP2) and to 'draw on multiple points of view and multiple ways of thinking' (GP19). Our participants also noted that innovation requires 'nurture' in teams (GP8). Universities are beginning to draw on change models such as Engstrom's Change Laboratory (Bligh & Flood 2015) where a wide range of actors, expertise and perspectives come together to bring about grass-roots transformation over time. A key insight of the Change Laboratory process is its embrace of contradictions which are then used as a fertile ground for transformative learning. While tensions and contradictions are inevitable in diverse knowledge systems, user-focused change processes like Change Laboratory allow the participant-change-agents to confront tensions and eventually bring about focused transformations.

Principle 4: Be ethical
Ethical approaches to innovation are increasingly recognised as critical to sustainable business models (Bryden & Gezelius 2017; Fontrodona 2013). Unsurprisingly, within the university culture in which all research activities include ethics review, our participants asserted that digital learning innovation projects must be 'underpinned by ethics (GP9)'. This ranged from a desire to promote open and transparent communication about project goals, decisions and processes – 'Be open and transparent (GP13)' – to the honest and inclusive ways in which actors give and receive feedback during the course of innovation projects – 'Always provide an honest opinion, show professional integrity regardless of consequence (GP18)'.

This builds on the lengthy discussion amongst participants about how large and small innovation projects need to involve various actors with diverse backgrounds and levels of authority and influence at the University – 'Integrate across the University (GP16)'. Engagement with such diverse stakeholders should encapsulate ethical and inclusive practices where all actors are aware of potential impacts or harm that projects might impose and actively address these as they arise. In effect, actors are then able to proactively project and manage risks related to projects. Some participants also touched on the importance of abiding by relevant University policies– 'Be mindful of policies that might apply (CP4)'. Universities have numerous codes of conduct, privacy requirements, and organisational consent processes that can be considered in setting up and delivering on innovation projects.

Principle 5: Start small and build up
Prototyping is an essential component in design thinking approaches (Razzouk & Shute 2012). In co-creating desired solutions quickly and iteratively, our participants reported that actors should start with small ideas and work towards realising bigger goals – 'Work small and fast (GP5)'. When operating within a risk- and failure-averse culture as discussed above, this is a fast and cheap way to validate ideas through low-fidelity prototyping and refine solutions through purposeful testing. In this process, project teams can not only get early agreement on priorities, scope of work and end goals but also use this as a check-in opportunity with wider stakeholders in progressing work inclusively and incrementally. This also highlighted the resilience required in innovation projects – 'Be resilient and fail fast (GP11)', 'Embrace your gut when it's cheap and fast (CP13)' and 'Keep going until someone says stop (CP1 and 2)'.

The importance of failure is discussed by Henriksen et al. (2017) in their empirical study of the application of design thinking to developing teachers' capacity in tackling educational problems. The study acknowledges that "the relative newness of design thinking in teaching and education means there is much that we do not know" (p.141), and the teachers participating in the 'Learning by Design' program, agreed that failure must be framed as an opportunity for learning and improvement, rather than a cause for punishment.

Our participants also discussed the opportunity that this approach provides to celebrate small and large project milestones. In complex projects, this is particularly vital in keeping contributors engaged with the progress over time and providing a sense of collective achievement along the way, rather than waiting to see 'big-bang' outcomes at the end, at which point it could be too late to alter approaches or address issues. This start-small-and-build-up approach – 'incremental and building on strength (GP8)' - is therefore also part of the engagement and risk management strategies for innovation projects.

Principle 6: Think holistically
The inevitable complexity of innovation projects was acknowledged by our participants. Generating new ideas and practices first requires a good understanding of existing social, cultural, political and economic contexts and issues as well as resources, for the identified problems to be resolved – 'Seek holistic & reusable solutions (GP15).' Innovation requires resources, both human capital (creative ways of using existing sets of knowledge and time) as well as financial resources. Our participants highlighted the many innovation projects already underway on different scales and timelines at the University. They noted that knowing about, and piggy-backing on or aligning with, related projects can help produce unique outcomes, while also avoiding duplication in processes and outcomes. Depending on the timing and scale of projects, there might be cascading impacts across the projects,– 'Be mindful of your downstream impact (sometimes better isn't better for everyone) (GP23)'. Holistic thinking also applies to the way we 'nurture' innovation. Our participants embraced a 'more powerful together' mindset (CP8) and urged managers to 'nurture innovation appropriately for the level in the organisation', including efforts to 'connect your people with others who can help realise innovation'.

Towards a definition of digital learning innovation

The six principles of the DLIF are largely congruent with those identified from the literature by Smith (2012). For example, Principle 5 ('Start small and build up') aligns with Smith's observation that "Innovation is time consuming and takes time to embed" with the DILF principle proposing a strategy for advancing innovation when navigating time and resourcing constraints. There is also clear alignment between Principle 2 ('Keep focused on your purpose') and 'Innovations that sit well within a specific context spread better'; both highlight the importance of clarity of purpose and context.

However, there are clear differences in language and emphasis, largely attributable to the different framing and focus of the two studies. Smith's (2012) principles were synthesised from multiple individual research projects and, as such, are institution-level observations of the conditions or characteristics required for successful innovation. The origin of the DLIF principles as practice-based advice from experienced innovators is reflected in their action-oriented, solution-focused framing, as guidelines for innovation. For example, Smith's first principle – "Senior staff need to support an innovation for it to spread effectively" – does not have a clear pair in the DLIF, although it relates strongly to Principle 1 ('Create a safe place for new ideas') and Principle 2 ('Keep focused on your purpose'). A culture of innovation, which supports the development and testing of new ways of doing things, requires the support of institutional leadership; similarly maintaining a strong sense of purpose and vision can ensure that the innovation is aligned with the University's strategic direction and vision. Smith's principle can be viewed as the condition required for successful dissemination of an innovation, whereas the related DLIF principles focus on actions staff can take to achieve that condition.

The DLIF principles are also influenced by a specific institutional context. For example, Deakin places strong emphasis on a whole-of-institution ('One Deakin') approach, reflected in Principle 6: Think holistically. This extends Smith's principle of "Institutional infrastructure needs to be in place to support the innovation" by reference to building synergies across different projects and awareness of upstream and downstream impacts. This principle is of particular importance during moments of crisis such as the pandemic, which acts both as a driver for innovation and a constraint on the resourcing required for sustainable innovation. Similarly, the use of Design Thinking and User Experience frameworks over a number of years is reflected in the emphasis on user focus (Principle 3) and ethical approaches (Principle 6). While ideas such as transparent communication are noted by Smith, the DLIF principles explicitly call out ethical approaches. This reflects both the prevalent

ethical frameworks of universities but also the strong practice-based framework of Design Thinking and appreciative inquiry approaches grounded in empathic understanding of user needs.

The DLIF principles reflect a practice-based, holistic conception of innovation as a process where co-creation and iteration are seen as both pragmatically effective and ethically enriching. When read against a synthesis of the existing literature, this work has led to a working definition of digital learning innovation as:

> Digital learning innovation iterates proposals that matter to collaboratively produce change in learning cultures at the intersection of people, pedagogies and technologies.

While it is acknowledged as argued above that there are many variations of the definition of digital learning innovation in the literature, this working definition encapsulates the ideal and practice of what those involved with driving innovation in digital learning at one university perceive it to be.

Conclusions, limitations and recommendations for practice

The importance of nurturing innovation cultures and practices in higher education has been emphasised during the recent pandemic which saw widespread unexpected transition to digital learning and teaching. As pressures continue to mount for universities through financial, geopolitical and environmental constraints, creative innovation will be essential to digital education futures, particularly in reconnecting the University with students and teachers. This paper described a case study where a bottom-up co-design process was undertaken to directly involve the change agents of digital learning innovation in the conceptualisation of principles for, and a definition of, digital learning innovation. This paper therefore offers inspiration for those universities willing to move beyond symbolic innovation, in highlighting that the co-design process itself can be just as powerful as the outcome of innovation. While the DLIF offers six synthesised principles as a way forward that might be applicable to other contexts, it is acknowledged that its application needs to be carefully considered to bring about productive innovation unique to those contexts. Additionally, while the stakeholder cohort in this case study was limited to staff stakeholders, due to the focus on internal staff working processes and not the outcomes of innovation, the role of students, both as impacted stakeholders of, and potential partners in, innovation, must be considered. Our analysis of the literature demonstrates that although there are general principles for successful innovation that appear to hold true across a range of contexts, a reflective, co-creation process that draws on the perspectives of stakeholders across the university can be used to contextualise those principles to individual institutions.

Acknowledgements

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