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Learning Design for digital environments: agile, team based and student driven

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Digital learning environments are a catalyst for change and development in Higher Education. One way to respond to this is by going to the foundation of the environment – the learning design process. Using an Australian university's major project in learning design as an example, this paper will look at how students need to be active members of Curriculum Design Teams to ensure that responsive, relevant and engaging digital learning ecosystems are created. Strategies based in design thinking, socio technical systems, learners as designers, and agile methodologies for project management, will be shown to be central to the effectiveness of the project. Challenges emerging from the projects' implementation are identified as key directions to be addressed in the evolution of the process.

Keywords: learning design, agile, digital learning, design thinking, elearning

Digital learning environments

The digital age brings with it many challenges and opportunities. For higher education this means change, development, uncertainty, and innovation and in many instances a rethink of how we engage in the core business of education (Beetham & Sharpe, 2013). Such a rethink involves a closer look at the pedagogy and the digital learning ecosystems (Reyna, 2011) that these new environments create. One such change can be seen in the terminology used, and the evolution of the term elearning to digital learning. To support this, Mason & Pillay (2015) argue that the development of digital tools has also enabled the possibility for learners to engage in enquiry that is critical and more in keeping with the demands of a learner for a global society.

As the digital learning environment changes for learners, what does it mean for teaching and the development of teachers in this space? The 2015 New Media Consortium Report for Australian Tertiary Education discuss what some of the implications of the digital learning ecosystem are for teachers and suggest:

> Resetting expectations for the roles of professors and other faculty is also chief among the concerns of the 2015 Australian panel. Integrating more personalised learning opportunities and student-led approaches challenge traditional perceptions of teachers. The goal is for professors and instructors to act as coaches and mentors, rather than lecturers. (Johnson, Adams Becker & Hall, 2015 NMC Technology Outlook for Australian Tertiary education, 2015, p. 3)

Such suggestions require a shift in thinking about the relationship between learner and teacher and more importantly the roles that each has in the education process. This paper will explore these issues from the perspective of the learning design process and how design thinking can be used to address some of these challenges while placing students at the center of this process by engaging with learners as designers. It will identify how engaging in design thinking can promote learning, using the example of an Australian University major project Global Learning by Design (Nicolettou & Soulis, 2014) and demonstrating how educators need support in viewing themselves as a *facilitator of learning* (Kolodner et al., 2003).

The idea of lifelong learning and equipping students to meet the demands associated with a challenging 21st century, requires that students are equipped with "meta competences". Education needs to transition from that of transferring knowledge to fostering individual skills in creative thinking

within a constructivist framework (Scheer, Noweski & Meinel, 2012). Such 21st century skills include design thinking that develop students' ability to solve problems, allowing for opportunities to experiment.

An example of a collaborative digital learning community is evident in Kolodner et al., (2003) work. They investigated notions of cognitive apprenticeship that sees the teacher taking on the role of coach or facilitator in the learning process where learners engaged in meaningful design challenges, creating physical artifacts and sharing insights into their designs. This resulted in the development of communities of learners that foster collaboration (Fisher & Herrmann, 2011) and allow students and teachers an opportunity to work together.

Design thinking

Constructivist theory identifies learning as being accomplished through experience, with the teacher as a facilitator of learning being able to drive a learning design experience for students. Engagement of learners within this process is a critical element of constructivist learning. As Scheer et al (2012, p. 9) state:

> Design Thinking realizes what is recommended theoretically in constructivist theory. Especially learning through experience and complex problem solving among other aspects are met in Design Thinking.

Siemens (2014) argues that traditional learning theories such as constructivism are limited when applied to digital learning environments. He uses the term connectivism, which encompasses elements of constructivism such as learning from experience, but takes it further to incorporate elements such as social connectedness, managing changing technologies, currency of knowledge and decision-making, to name a few. This view supports the idea that for learning and teaching to be effective digital learning ecosystems, the way universities approach learning design needs to adapt.

Owing to the complexity of modern problems, design is not characterized as standard problem solving where the problem and solution are seen as separate, the approach is very much a non-linear one (Cassim, 2013). Design thinking is well suited to educational approaches particularly in digital learning, where solutions are non-linear, as it is thinking that works on "creative hunches" based on incomplete information and abstract forms of thinking (Burdick & Wills, 2011).

Further to this, Razzouk & Shute, (2012, p. 14) state:

> We believe that design thinking is more than just a skill to be acquired and used in limited contexts. Rather, we view it as a way of thinking and being that can potentially enhance the epistemological and ontological nature of schooling.

Taking design thinking to a larger scale, the Hasso Plattner Institute at Stanford University usually referred to as the //d.school// has effectively incorporated it as a 'foundational component' of its approach to undergraduate programs. In terms of delivery, d.school classes are team-taught with instructors and students coming from a range of disciplines and backgrounds (Miller, 2015). Larry Leifer, professor of mechanical engineering and director of the University Center for Design Research, in an interview for the Chronicle of Higher Education, stated:

> …the d.school is a kind of anti-university. Universities and their academic disciplines, he says, provide 'context-independent knowledge'. The world and its problems are not, however, organized by discipline. (Miller, 2015)

Education however is built around disciplines and isolated subjects, which ultimately result in breaking down the complexities that are found in real life (Scheer et al., 2012). The d.school is certainly an interesting model; showcasing the potential for design thinking within a university context, that is attempting to tackle the complexity of modern problems.

Teacher as learner

What then is the impact of such changes for the teacher? Here, we see changes to the role of the

teacher from 'knowledge expert' who structures curriculum and learning activities to 'facilitator or coach' in an at times unknown learning path. Kolodner et al. (2003) address the practical issues in the Learning by Design approach in identifying that teachers were not totally comfortable with making inquiry happen in the classroom. They also talk about supporting teachers to learn facilitation skills, as a way of introducing a 'collaborative culture to the classroom'. Further to this, Kapur & Bielaczyc (2011) in their study *Designing for Productive Failure* outline the need to provide teachers with professional development training on facilitation skills and strategies. In their study the role of the teacher (in the productive failure control group) was not to provide any direct instruction or content related support, but manage the classroom and provide an environment for problem solving.

> We worked with the teachers to not provide assistance when asked for but rather to constantly assure students that it was okay not to be able to solve the complex problems as long as they tried various ways of solving them, especially highlighting to them the fact that there were multiple representations and solution methods for the problems. (Kapur & Bielaczyc, 2011, p. 52).

Their study concluded that compared to *direct instruction*, the student cohort engaged in *productive failure* seemed to engage in greater conceptual thinking without compromising performance on well-structured problems. Further, students' solution methods better correlated with the learning outcomes. What Kapur & Bielaczyc (2011) inadvertently identified was that facilitation skills are critical; teachers need to move away from the role of teachers to that of coaches and facilitators, allowing for more inquiry and problem based learning (Kolodner et al., 2003). Teachers as facilitators of learning, require current skills and a toolkit to actually practice on the key competencies of learning (Scheer et al., 2012).

Within an academic environment the role of the teacher as the sage on the stage needs to be challenged. It is not as Kolodner et al., (2003, p. 541) indicate 'for teachers to be better teachers' but for teachers to rethink their role as designers of learning, incorporating design thinking into their curriculum and teaching.

Learners as designers

How do you engage learners, and make them a part of the design thinking approach? Owen (2007) highlights a number of design characteristics, such as being centered on a concern for people and the environment, the ability to visualize, use of language as a tool, the importance of teamwork and the important trait of avoiding the necessity of choice; all critical skills for a 21st century learner.

One way to engage learners in the design is by incorporating cycles of redesign or even under design (Fisher, 2011) into the process. Trying to find solutions by exploring, then coming together with peers to present their artifact and receive feedback, which ultimately leads to self-reflection, and then further iteration on the design.

Can the skills be learnt? According to Razzouk & Shute (2012) with sufficient practice in meaningful environments as well as adequate feedback and scaffolding, students can learn design thinking. Approaches that involve problem-based learning and inquiry-based learning can ultimately all enhance the students' design thinking skills (Dym et al., 2005).

Encouraging students to think like designers will enable them to better prepare for complex problems not only within their careers but life in general (Razzouk & Shute, 2012). As Fischer (2011) highlights, students are viewed as consumers rather than inheritors of problems, if we don't engage them in activities that are problem-based and inquiry-driven, how will they develop such skills? How will they problem-solve? Perhaps through design thinking students can bridge across to a connectivist learning framework. Within that framework, we need to embrace elements of productive failure (Kapur, 2008), as students need to be encouraged to engage in activities that foster collaboration.

Educational institutions often treat learners as consumers. As a result, learners feel disconnected from the decisions made on their behalf by teachers, and are denied from actively contributing to what will ultimately affect them and their learning. Higher education very much models this approach from how it delivers its curriculum, to how students are supported within various services such as the

library, learning centers and counseling. Students are effectively passive participants.

With the advent of social computing a shift has occurred away from a culture of consumers to that of a culture of participation. We have moved away from a world where a small number of individuals define the rules and laws to one where most people are able to actively participate. Within socio-technical environments cultures of participation not only encourage and support users' participation but also judge it as critical (Fischer, 2011). Socio technical systems (STS) are now everywhere, a part of our personal and professional lives, with some of these overlapping between both domains. Organic in nature successful socio-technical systems rely on the affordances offered by meta-design and cultures of participation. It explores the user as the critical element in the design in order to have systems that are functional and sustainable.

Fischer & Herrmann (2014) discuss how due STS's organic nature co-design is critical not only for their inception but also how they will be ultimately used. STSs can best be described as taking on two different stages in their development the design time and use time. In the design time, system developers anticipate possible needs of users (who may or may not be involved) and create systems on their imagined needs. At use time, users will use the system, however because developers could only perceive what their needs or contexts could be at design time the system often falls short of meeting the user's requirements which then means modifications need to be made. This leads to the critical point within the Fischer and Herrmann (2014) paper that the need to 'empower users as designers is not a luxury but a necessity'.

Due to this complexity, STSs require what Fischer and Giaccardi (2006) have described as 'meta design' or 'designing design'. This framework is emerging as an opportunity to view socio-technical environments as 'living entities'. It is built on the premise that systems need users at design time to act as co-designers at use time. It requires a sense of pliability and not a fixed premise during the design stage. What we have here is a rationale for greater student involvement in learning design.

'Global Learning by Design': one university's approach to learning design

An example of meta-design and user involvement is our work at RMIT University on a major project - Global Learning by Design (GLbD) - which illustrates the importance of users as active contributors from the outset. The work centres on elements of Agile design methodologies as 'going beyond' the meta-design and fostering cultures of participation within Curriculum Design Teams (CDT). As its foundation the project establishes CDTs which include academic and support staff that work together using Agile methodology to create learning objects that are captured as learning design patterns for reuse by other discipline areas (Nicolettou & Soulis, 2014). To interpret the concepts identified by Fisher & Herrmann (2014) the example used, will be our own experience managing this project. The vision of GLbD is to provide students with choice in relation to their learning material and use of educational technologies that are innovative and practical.

The idea of creating CDTs was premised on the context that all stakeholders must be involved in the learning design from the outset, in order to foster a culture of participation. If users or user representatives, in this case teaching staff and support staff, where bought into the process at a later stage (as has occurred previously in curriculum design) they would feel "misused" and would not foster a sense of ownership with the project (Fischer, 2011).

The approach with CDTs in 2014, as part of the GLbD project, fostered a more meta-design approach. However what was missing, was the users themselves - the students. In 2015 CDTs have included students from the outset. The inclusion of students within the CDTs has not only changed the dynamics of the group but has provided valuable input into the design of what in most cases will be a socio-technical system. Students are now informing the design and commenting on modifications, in some instances students are being employed on a casual basis to work on projects or are having their efforts acknowledged as a part of their assessment. The process is also allowing students to work in an authentic workplace context focusing and refining their professional skills.

Agile approach

Through the GLbD project we have incorporated elements of agile thinking to the learning design

process. We have attempted to foster an approach that is nimble and agile; being able to respond quickly to changes and user requirements. The idea of agile development was born in 2001 from a group of methodologists coming together to pinpoint some broad principles of developing software, culminating in the Agile Manifesto (Chookittikul, Kourik and Maher, 2011). The manifesto recognized that the main elements of agile principles should be adaptive, iterative, straightforward and promoting communication. We identified and incorporated some of those key principles into our work with CDTs that include (Nicolettou & Soulis, 2014):

- face to face meetings
- identifying motivated individuals
- building trust
- technical excellence
- good design

In attempting to foster these principles, CDTs were only part of the answer. What was required was an agile approach to getting the work done, and this is where the software package Trello (www.trello.com) has become affective. Working with Trello has allowed transparency and a collaborative approach to being able to do good design. It has dramatically reduced the amount of emails, making it the venue for communication and completion of tasks. The project coordinator acts as moderator and reminds staff of pressing items that need to be completed. A spreadsheet can be easily exported to identify at what stage tasks are at: To Do, In Progress and Completed. It has allowed for projects to be designed and delivered within a very short time frame. The affordances of the software has allowed for us to draw in our colleagues from offshore campuses.

In 2014 Global Learning by Design delivered 12 projects, as of July 2015 we are on schedule to deliver 60 projects by the end of the year. The only variable that has changed from 2014 is the team has employed one extra Educational Developer. In an environment where institutions are rapidly attempting to embrace technologies that are innovative and sustainable these outcomes have been welcomed.

GLbD has now been able to build trust and ownership amongst the staff as a good model for learning design. The next evolutionary phase of GLbD is to be able to seed projects to allow for evolutionary growth and reflection allowing users (students) to bring back their evolved system to the curriculum. The other critical element within this approach is the need to continue to have students as active participants and not as Fischer (2011) terms consumers. It is fundamental that through GLbD we are able to foster a culture that allows students an opportunity to design their own learning, and move from that of consumer to an 'owner of the problem' (Fischer & Herrmann, 2014).

Challenges

There are a number of tensions that can be drawn from meta-design and cultures of participation. Meta-design just by its nature creates tension, for example between standardization and improvisation (Fischer & Herrmann, 2014). In at least one GLbD project we have witnessed an approach of too much improvisation as staff wanted to continually keep adding functionality to the socio-technical system, in this case an online e-studio platform. In order to find the right balance, a solution was to end at iteration i08 and send that back for user testing. The developer also welcomed this approach after working solidly on the project for 3 months. Here the challenge presented is that being able to foresee uses at use time cannot be completely anticipated at design time, hence the need to stop and test.

Participation overload is a potential drawback within meta-design; participants within these cultures of participation may be forced to contribute to personally irrelevant activities (Fischer & Herrmann, 2014). Within GLbD we incorporate a number of support services (library, study and learning center & employment services) in the CDTs. However during the early scoping stages of the project, it may become apparent these services are not required, and if this is the case it needs to be quickly addressed and resolved.

Quality and reliability are challenges highlighted by Fischer (2011) that will require further research, as a greater volume of people are involved and can contribute. Questions such as: how are we able to assess for quality and reliability of systems? As systems are being built and implemented what

testing occurs beyond that? What is the life-cycle of the re-seeding process? How many iterations can a system have? All questions that need to be raised if we are to evolve this learning design process.

Measurement will be a major contributor and indicator in future decisions of designing socio-technical systems. A pressure on GLbD this year is how are we measuring the results? How are we improving the student experience? In most instances it can be as simple as measuring how many times students visit a site, its usability, and of course the student surveys where questions need to be linked to specific elements of what has been designed, but is this sufficient? We believe not. Evaluation, not just measurement will be a key focus of GLbD 2016.

Capturing the responsiveness, engagement, collaboration and sharing of practice is challenging; it is here where cultures of participation need to 'go beyond'. What environments like Google+ are now able to do is support these cultures through a virtual community where stakeholders across all projects in GLbD are able to come together and share artifacts such as images, videos, blog posts, papers, patterns and upcoming events. This identifies elements that Fischer (2011) describes as mutual benefit, selflessness in sharing, and empathy in realising that peers are experiencing similar challenges and concerns. This is where:

> …the rise in social computing has facilitated a shift from consumer cultures to cultures of participation (in which all people are provided the means to participate and to contribute actively in personally meaningful problems). (Fischer, 2011 p.42)

It is in such communities that expert knowledge is blurred as participants become experts and experts become participants. Once projects are delivered and implemented it allows for participants to continue to connect and reconnect. Motivation remains high as participants may discover new ways of working or producing learning resources. Community sites also allow for feedback, goal setting and specifically relevant information, all of which are important in motivating people to change their behavior.

Conclusion

STSs cannot be designed to envisage all future demands and that users being involved as designers is critical. This case study illustrated how a major project on learning design can and should incorporate major elements of meta-design as a framework as well as use agile methodology to facilitate trust, collaboration and good design. Students as end users are critical if we want to move away from a culture of consumerism to one of ownership and participation. Meta-design is about changing and challenging human behavior, motivating and not leaving the decisions in the hands of the 'experts' (Fisher & Herrmann, 2014). In using this framework GLbD has had a major impact across the university and is now seen as the model for good learning design, as one academic commented, 'it changed my life'.

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