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Innovation and Design Change Strategies for Learning Technologies at Warwick Towards a 'design capabilities' heuristic for guiding practice and evaluating change.

"Teaching is not rocket science: it is much harder than that. Rocket science is about moving atoms from a to b; teaching is about moving minds. And the whole point is to change those minds into independent thinkers who will not necessarily bend to the will of the teacher."
Diana Laurillard in *Teaching as Design Science* (Laurillard, 2012: Kindle location 314).

Overview

Initiatives that aim to enhance university teaching and learning through technology typically fail in four ways:

1. Under-resourced and over committed - the problem that we spend most of our time worrying about.
2. Irrelevance through overconfidence - a technology is introduced that embodies a definitive set of practices, on the assumption that it will fit with generic practices, projects, concerns and attitudes that are at best only relevant to a small subsection of the institution's population for a short time span, and at worst, fail to gain any "buy in" from the target audience.
3. Lack of ambition - enhancement efforts focus on the few generic and uncontentious problems that can be identified, for example making administrative processes simpler, with only marginal positive impact on learning and no contribution to developing pedagogy and people in the long term.
4. The "sculpture trail" (as described by Ken Sloan) and hype-churn - we can show-off lots of interesting projects, done by different people over time, but they are not connected together by a deeper or wider capability building.

This investigation looks at how a focus on designing as a social process, and upon the development of design capability can provide a fifth more effective paradigm: design led innovation, finding and solving important problems at different inter-related scales and developing capability with a built-in appreciation of sustainability and quality.

This report gives a narrative account of the investigation. It begins, in the *Introduction*, with definitions of key concepts: design, designing, successful design (achieving fit, stick, spread and growth), design change and design capability (although this last term is only really fleshed-out in *Reading the Case Studies* and the *Conclusion*). These words are common currency, but rarely

used with precision. When clearly defined they provide a lens through which we can attain more clarity and granularity in analysing attempts at enhancing practice. In the second part, on the *Origins of the Investigation and Earlier Experiments*, we examine the limitations of a techno-centric approach to understanding, predicting and supporting the uptake of technology enhanced learning. It is argued that a design capability approach is needed, in which the ability of all people (including students) to discover, create, adopt, adapt designs that fit, stick, spread and grow is of prime value. In part 3, the design of the investigation is explained, with its focus upon discovering, creating and using *design patterns* as a key facilitating aspect of design capability. In part 4, this is put to the test, with an attempt at *creatively* reading the 23 mini case studies produced in interviews with academics. However, design patterns do not emerge easily from the cases, and we see that design and designing in this setting is more diverse and complex than expected. It is argued that a design patterns based approach will be useful, but much more work needs to be done before design patterns can become the *lingua franca* of teaching and learning design and development. This leads to a more sophisticated view of design capability, presented in the *Conclusion*. Drawing upon the experiences of the academics interviewed in the case studies, especially experienced and confident senior academics, it is conjectured that we need to increase the intensity with which academics encounter and reflect upon design challenges, designerly approaches, suboptimal and successful designs and design patterns. A combination of Design Thinking and the Higher Education Academy Fellowship framework is recommended as a way of achieving this.

These findings lead to three interconnected recommendations:

A. That we use the successful "three spaces participatory Design Thinking" approach (developed by IDEO) to investigate important areas of activity (e.g. seminar teaching) with the aim of developing clearly stated design challenges of proven significance; creating, testing and refining a range of design ideas; implementing ideas as new products, services, practices etc that **fit, stick, spread and grow** (taking this as the measure of success, defined in this report). This needs to be done as a collaboration (students, ITS, LDC, IATL, Library, Careers and Skills, academic departments etc). Design patterns are a medium for this collective design activity, but will not emerge and circulate without dedicated facilitation.

B. This should be closely integrated with the "fellowship" approach to career and academic community development being adopted by the Learning and Development Centre (and more widely across UK HE), in the form of the Fellowship of the Higher Education Academy (FHEA), with explicit hooks between: fellowship and network development and facilitation by LDC, and Design Thinking activities happening across the University. The use of design patterns should be encouraged as part of this.

C. A generic account of design capability should be translated into a more detailed picture of how different kinds of people in different parts of the University achieve successful design for different purposes (e.g. how good lectures get designed in Maths, Chemistry, English, Sociology etc). We can then evaluate tools, spaces, processes and other enabling and constraining factors involved in designing.

Four starting points for action are recommended:

1. What is happening at Warwick already? We should build upon *similar* kinds of activity already happening, for example IATL's approach to the development of interdisciplinary teaching. We also need to look for cases where a similar approach has been used in this context in the past, and learn from these cases. For example, the Reinvention Centre's successful exhibitions on "The Idea of the University" (2010)¹ and "Sociologists Talking" (2008)² gathered a range of media (text, voices, still images, maps, video) into a physical (and accompanying online) space, with inspiring, challenging and idea-provoking results that have become part of the institution's memory.

2. We should look for points in existing workflows at which designerly practice may become standard practice. For example, the module review and approval workflow would be a good place to start. David Davies of the Warwick Medical School has also suggested that mobile apps in the style of *Unstuck* and the *IDEO Method Cards* could be developed as a way of giving design thinking guidance and inspiration "just -in-time".

3. We should look for examples of this kind of practice in similar settings. For example, Sheffield Hallam University have pioneered a role for students as "course design consultants"³, as part of the Higher Education Academy *Students as Partners* change programme⁴.

4. An extension of the case study investigation, aiming to develop a more complete account of design, designing and design capability.

¹ http://www2.warwick.ac.uk/fac/cross_fac/iatl/cetl/filmspublications/ideaofauniversity/

² http://www2.warwick.ac.uk/fac/cross_fac/iatl/cetl/filmspublications/sociologiststalking/

³ <https://blogs.shu.ac.uk/see/cdc/>

⁴ http://www.heacademy.ac.uk/resources/detail/change/SAP_CP

1. Introduction

In 2012-2013 I carried out 24 interviews with recognised innovators from across the university, with the aim of improving both my own practice as an advisor and the wider *developmental* practice of the support services involved in learning technologies at Warwick. The first interview was with Ken Sloan, Warwick's Registrar (chief executive of the administration). Ken emphasised the importance of having a critical awareness of how aspects of the university get designed and constructed (as opposed to having always worked that same way), and of understanding the link between ***focussing upon achieving effective outcomes over time, actions that build capability and character, and viewing design challenges through a joined-up horizontal lens*** (not a vertical, territorial lens). My approach is inspired by this wisdom. The investigation was not about the latest hot gadgets or about the next big revolution in learning technologies (which always inevitably fails to materialise). In fact surprisingly few cases of technology-led change were discovered. Instead, the investigation was about how positive change comes about, and the role of people, designed practice and emergent practice (or serendipity) in making it work, and only then the role of technologies in removing barriers, giving fresh insights and facilitating change (for example, Moodle's visualisations of the patterns of feature-usage). Peter Goodyear's recent collaboration with Robert Ellis (Director of eLearning at Sydney University) on *Students' Experiences of E-learning in Higher Education: the Ecology of Sustainable Innovation* highlights the importance of this challenge. They argue that much has been written "advancing claims for the benefits of a new technology", learning technologists do that all the time, but evangelising is of little use if we fail to understand "how it may become an integral part of the totality of provision for teaching and learning" (Ellis & Goodyear, 2010: Kindle location 591). This can only be achieved through studying innovation and design change practices at a local level, and then building a picture of diversity and interconnections across the institution: "...flexible, responsive, embedded approaches are needed. In an age of uncertainty, resilience depends upon organisational learning..." (*Ibid.* 648). This investigation is *organisational learning*.

In each case I worked with the interviewee to produce a narrative description of a significant case of *innovation* (globally novel practice) or *design change* (locally novel practice). Together we documented potentially significant information including what was changed or invented, who was involved in the change, what the motivation was, what triggered the fresh thinking and actions, barriers to success, and how the changes were successfully designed, implemented and sustained. The investigation and this report use the following working definition of design:

A recognisable pattern of practices, to some extent intentionally designed, and used for specifiable purposes. A design is assembled from a range of different types of practices

that interact with each other and change dynamically, including epistemic, cognitive, social, bodily and technical. These assemblages help us to respond to the world, consciously or unconsciously, and reshape elements of it so as to address our concerns and to work on our projects (which might, reflexively, concern improving the design of our practices: *learning*).

It is important to be aware that not all designs are of a simplistically *functional* type - where a chain of actions and interactions deterministically produces a well defined result. Designs can have a range of outcomes that are not deterministic. We can describe the different types of outcome with terms like these (just a small selection):

- *constitutive* - where the design creates a common ground within which collaboration occurs;
- *reflexive* - we are encouraged to think about our own position and actions;
- *enframing* - where we are drawn to see things from a particular perspective;
- *generative* - where the design defines a constrained pattern as a starting point which then acts as springboard for creativity;
- *aesthetic* - where the design sets a mood in which actions may take place;
- *holistic* - we stand back from and see things as a joined-up whole;
- *empowering* - channeling and distributing the capability to make changes and effects;
- *disruptive* - the design causes a breakdown in the prevailing conditions.

We can use the same terms to describe design elements or moments within a design. Designs of these and many other kinds are essential in education, but are sometimes overlooked in favour of more easily measurable and predictable functional designs of a deterministic type.

Designing is the activity through which we create or select, adopt and adapt designs. Designing is the work of professional designers of many kinds, and to an often unrecognised extent, ordinary people in everyday life and work. Universities are design intensive places, in which everyone is engaged in designing. We can recognise successful designing through these criteria:

An effective, successful design change sees the adoption of practice (including technologies) that **fits** better with our purposes, concerns, knowledge, concepts, skills, social context, aesthetics and other enablements and constraints as they develop interactively with the new practice; **sticks** with us over a time span that justifies the effort in creating, adopting, adapting and maintaining it, and continues to be useful as our personal goals and concerns change; **spreads** to other people and other contexts, thus enhancing our capability to support it through a collaborative 'network effect'; and **grows**

in some of its aspects, in useful ways over time, leading to a growth in our capabilities, and perhaps a positive development of our motivating concerns.

An additional level of complexity exists in educational designs, where we might want participants themselves (teachers or students) to modify or create designs so as to achieve better fit, stick, growth and spread. In the conventional *Diffusions of Innovation* model (where innovations are invented by specialists and transmitted to users who adopt at different rates) this would be termed "re-invention" (Rogers, 2005: Kindle location 968), and is considered to be a rare occurrence. In the university, re-invention is everywhere. The process of modification and creation might even be an important learning objective - where students become designers or co-designers, either to learn by unpicking existing designs, to learn about the constraints and enablements that are present in a domain, or to produce genuine innovations of their own (students as producers/designers). This will inevitably involve a reflexive designing of the means of designing. It gets complicated, especially when a point is reached at which we should probably abandon an old design. Designs can be too sticky when significant cognitive or social dependencies are built-up around them. Writing in *The Sciences of the Artificial*, Herbert Simon described how this resistance to change is to some extent built into designs as *homeostasis*:

"...the designer insulates the inner system from the environment, so that an invariant relation is maintained between inner system and goal, independent of variations over a wide range..."
(Simon, 1996: p.8)

Reflexivity, critical thinking, sketching, storyboarding (and other representational means of visualising the design in use), creativity and play are required in order to move things on. These cognitive and social activities are just as important in designing as are requirements gathering, analysis, planning and management.

To be clear, the aim of the investigation was not in the first instance to identify actual designs as top candidates for meeting the criteria (fit, stick, spread, grow). Rather, the aim was firstly to get a better understanding of how, in the varied contexts that constitute the university, designs are created, adopted, adapted and sustained - so that we can tap into and facilitate the existing 'pipelines' of emergent design change, and ensure better outcomes, or if necessary, create entirely new pipelines. Once that knowledge is in place we can use it to prime the process and facilitate specific design changes through the precarious pathway from speculative glimmer to sustained success. We may then more accurately evaluate and enhance our processes. However, as research on professional designers (Schön, 1986 is especially good on this) and craftspeople (Sennett, 2009) indicates, the means by which designerly judgement is applied and "moves" are made (for example, focussing upon playing with variations in a specific aspect such as the aesthetic) tend only to be embedded as tacit knowledge in practice, and only expressed

when in a designerly *conversation with the materials* (Schön, 1986: p. 42; Sennett, 2009: p.125). Donald Schön describes the complexity of the process in *Educating the Reflective Practitioner*:

“Their designing is a web of projected moves and discovered consequences and implications, sometimes leading to reconstruction of the initial coherence - a reflective conversation with the materials of a situation.” (Schön, 1986: p. 42)

The challenge then, through the exploration of case studies, is to bring out the workings of this tacit knowledge and to *design* better support so as to enable it to flourish.

The call for participants went out through many channels. However, the best response came from a mailing list including all of the recipients of teaching excellence awards (Warwick Award for Teaching Excellence and the National Teaching Fellowship). It is obvious that this could not constitute a simple representative sample of the thousands of academics at Warwick. They are, however, representative of an important subset of academics: those with more opportunity and inclination to create change. Their familiarity with the joys and vicissitudes of doing innovation at Warwick was clear from the outset. Almost all of the interviewees gave well-thought-out and highly reflexive accounts, with very little prompting (as one would expect of award winning innovators in academic practice). The form and content of the narratives, so freely produced, proved to be quite incompatible with the much more structured, design-process inspired, narrative that I had expected. I consciously avoided shoehorning their stories into my framework (after noticing myself doing so in the first two interviews), being aware that we can learn as much from the form of the narrative as from its content - especially concerning the subjective experience of doing design change.

My methodology has been *phenomenographic and rhizomatic* (O'Toole, 1997), starting from many singularities in subjective accounts to discover ineliminable differences and interconnections, with an eye for patterns and potentials, and an awareness of the role of chaotic and constraining factors. My approach has deliberately not remained static and consistent. I do not present a view from above, but rather a dynamic account from inside. It has adapted iteratively to what I have discovered 'out in the field', and through a reading list that has emerged out of the investigation. The approach draws from a *design patterns in participatory design* approach (Goodyear, 2004), but has learned from the limitations of using design patterns in academia - limitations encountered during the creation of the case studies. The *Design Thinking* strategy described by Tim Brown of the IDEO design company (Brown, 2009) is seen as an effective solution to these limitations. Ellis and Goodyear's *ecological* understanding of e-learning is used to connect Design Thinking and higher education. My concept of *design capability* is developed from these and other sources, and provides the basis for my eventual recommendations - where the development and evaluation of such a capability is brought to

centre stage, and a range of formal and informal methods and tools, including evaluation tools, are integrated into our practice.

After much reflection, and a synthesis of research on professional design processes (Schön, 1990; Lawson, 2005; Cross, 2007; Brown, 2009) with recent research on academic life (especially Hughes, 2011; Hughes and Tight, 2013), craftwork (Sennett, 2009) and new types of space-place and spatial production (Thrift, 2008) a much more sophisticated *design capabilities* approach crystallised - concerning people's ability to achieve well designed practice through effective design (as defined above). Ken Sloan describes his institutional change strategy as focussing first of all on developing capabilities across and despite of organisational constraints:

"...creating the behaviours, the cultures, the approaches, which mean that even though we're organised in resource terms in a particular configuration, we work together to deliver the outcomes."

The strategy then is to develop a capability for better design for better services, events, projects and places. As with the "human capabilities" approach used in international development studies (Nussbaum, 2011) the design capabilities approach does not offer a single reductive solution to all cases. Instead it aims to enrich planning and design discussions, both within the individual scope and the institutional scope, with a more detailed and thought-provoking set of heuristics concerned with empowering our collective capabilities for being inspired, generating and evaluating ideas, and putting innovations into practice. As Ellis and Goodyear argue, reframing the debate to focus upon capabilities fits better with higher education, being more closely aligned with its aims and methods:

"Our point is not to discourage talk of outcomes and skills, but to encourage some pedagogical realism. Being able to talk with some precision about the kind of capability needed, and how it can be acquired, it at least half the battle." (Ellis & Goodyear, 2010: Kindle location 846)

Similarly, Nigel Sykes of Warwick Business School recommends that businesses evaluate their progress using a capability-based approach:

"...we often perceive organisation development by some reference to economic performance when capability or potential may offer broader and more helpful insights." (Sykes, 2008: p.8)

I believe that the capabilities-based approach more effectively addresses the concern that triggered this project: improving both my own practice as an advisor and the wider *developmental* practice of the support services involved in learning technologies at Warwick.

2. Origins of the project and earlier experiments

The case studies project developed out of unsatisfactory attempts to reconcile my academic technology advisory practice and my successful academic collaborations with the dominant *service-oriented* management paradigm and its leaning towards standardisation, measurement and incremental optimisation. Discussions within IT Services emphasised the need for a more developmental view on our activities, as opposed to the existing ethic of “be busy, do clever things and make individuals happy”, or as it was more incisively described “throwing mud at the wall to see what sticks”. Ken Sloan (in the interview with which the investigation began) described this unproductive approach using the metaphor of the “sculpture trail”:

“I often ask the question: of the things we have in the strategy, and the things we do because of the strategy, how many of them will have become part of the core of what we do? So will they have become elements of a sculpture trail: “we did that it was beautiful there it is, we did that it was beautiful, and there it is”...so you can see it in the institution, as an output of a creative piece, but it hasn't changed the institution. It gives a colour and a texture but it hasn't changed the institution.”

An initial pan-institutional survey, undertaken with a single representative from each department, sought to create a matrix of “learning technologies” and “level of adoption in departments”. The list of learning technologies (Powerpoint, Forums etc) formed a catalogue of technologies currently available, along with a few emerging technologies that might have been in use by early adopters. In addition, the survey would measure satisfaction in each department with the fitness-for-purpose (the locally defined purpose) of the items on the catalogue. The fundamental weaknesses in this approach were evident from the start, but the work was undertaken with an acceptance that some information is better than no information. However, the resulting data proved to be near to meaningless for three interesting reasons:

1. Most learning technologies work only as basic building blocks of functionality, with the potential of being combined with people, practices and other technologies, so as to provide genuine benefits. The value lies in the people, the practice and effective design. For example, in Peter Corvi's case study (WBS) we find a sophisticated workflow built from online discussion forums in the MyWBS virtual learning environment. Similar technologies are used elsewhere at Warwick, but their use bears little resemblance to Peter's designs. Comparisons are enlightening, but not if we overgeneralize.

2. The diversity of practice is too great to be easily captured within the feasible number of interviews, especially in an institution in which design agency (but not necessarily capability) is often devolved down to the lowest possible level, and where an ethic of independence and

personal development comes first. The shift to digital technologies further frees-up this diversifying trend, with digital being less permanent and constraining than bricks and mortar, and hence offering a pathway to escape the limitations of infrastructure. We might be able to specify a baseline of essential practice, but it would only account for the absolute basics. The diverse practices that make academic activity valuable are quite different to, and not proceeding from, those basics. Learning technologies are adding to this fundamental diversity. At the same time as the survey was being carried out, the current evolutionary explosion in easily accessible technologies was already rendering the catalogue based approach obsolete - the off-the-catalogue elements of the survey interviews in fact revealed the rapid growth in the importance of non-institutional hardware (especially mobile), software and web services. A diversity of new practice is rapidly forming around these new tools.

3. Estimates of "satisfaction" are notoriously unreliable, being skewed by cognitive bias effects such as "continuity", "priming", "emotional coherence" (Kahneman, 2011) and especially "adaptive preference" (Nussbaum, 2011). It gets even worse. Tim Brown (of the design company IDEO) identifies a fundamental challenge to positive change. There is a feedback loop between adaptive preference, behaviour, bad design, emotional coherence and back through to adaptive preference:

"The basic problem is that people are so ingenious at adapting to inconvenient situations that they are often not even aware that they are doing so: they sit on their seat belts, write their PINs on their hand, hang their jackets on doorknobs, and chain their bicycles to park benches." (Brown, 2009: Kindle location 509).

At the opposite end of the spectrum, the "halo effect" (Kahneman, 2011: Kindle location 86) describes how a strong liking for a person or an object spreads to other associated aspects of the person or object without passing through any kind of critical assessment or evidence grounded in experience. The halo emanating from a technology's "newness" is often enough in itself to persuade people that they are satisfied with it. A negative halo effect also applies.

Worthwhile evaluations of fitness-for-purpose need to be carried out analytically, based upon well-described specifications of purpose and practice and an accurate estimate of the match between the technology and the ability of users to adopt and apply it (which in this context is highly variable). However, such analysis may be highly context specific and fail to provide generic transferable guidance. As Mor and Winters argue in their analysis of the usefulness of Herbert Simon's *design science* when applied to educational design, the "purpose" side of the "fit-for-purpose" equation is in reality hard to pin down:

"...the questions of education, by their imperative nature, are evidently derived from the observers' (often implicit) ethical, social, and community agenda." (Mor and Winters, 2007: p.62)

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In his epic survey of quality regimes in UK HE, Paul Greatrix (Registrar of the University of Nottingham) examined the problems that this poses to benchmarking exercises of this kind:

"...you cannot pre-specify creativity; the danger that the atomising effect of the approach ignores overarching capabilities; the need to reflect and encompass development of the subject over time; the difficulty of capturing explicitly and semi--permanently the dynamic nature of knowledge; and the bureaucratisation of learning inherent in this kind of approach." (Greatrix, 2005: Kindle location 7176)

Yes, it's not rocket science, *it is far more difficult.*

3. A shift in strategy: emergent design patterns

Diana Laurillard begins her book on *Teaching as Design Science* by stating what I believe to be the most important consideration for learning technology advisory services:

“We cannot challenge the technology to serve the needs of education until we know what we want from it. We have to articulate what it means to teach well, what the principles of designing good teaching are, and how these will enable learners to learn. Until then, we risk continuing to be technology-led”. (Laurillard, 2012: Kindle location 314).

Laurillard advocates a design-led response to this challenge:

“The imperative of design logic in any context says that it is important to align what you intend to achieve with the way you go about it, and with the way you will judge your success in achieving what you set out to do.” (Laurillard, 2012: Kindle location 1729).

Importantly, she also promotes a *design patterns* approach so as to retain the necessary adaptability of designs and design science across heterogeneous contexts - capitalising upon the abstracting, generalising, reusability-enabling power of pattern-based design thinking. Laurillard uses a neat definition of the concept taken from an exploration of design methods in education by Yishay Mor and Niall Winters:

“A design pattern is a semi-structured description of an expert’s method for solving a recurrent problem, which includes a description of the problem itself and the context in which the method is applicable ... Design patterns have the explicit aim of externalizing knowledge to allow accumulation and generalization of solutions and to allow all members of a community or design group to participate in discussions relating to design.” (Mor and Winters, 2007: p.66)

A design pattern is then a **statement of a problem** plus a **pattern of actions and interactions that addresses the problem** with **links to related patterns** (including patterns that are used in the pattern, and patterns that use the pattern), elaborated with **information on its originating context and the concerns, values and problems out of which it arose** and **advice on implementation and customisation**. The pattern is usually headed with a **catchy and meaningful title**. In some disciplines the inclusion of diagrams and images is considered essential. In education, this might be best achieved with a **storyboard** or even a **video**. All of these elements are intended to act as a **guide to design activity and a prompt for thinking and prototyping**. Here is a simple example pattern:

Enriching Personal Tutor Meetings with E-portfolio-based Narratives

It is hard for a tutor to get a joined-up view of a student's work and experiences. At the same time, many students struggle to improvise verbally a reflexive narrative with evidence in the time-constrained and potentially stressful context of a tutorial.

In this pattern, the student creates narratives in advance from a rich collection of materials. This can be viewed in advance of the meeting, and in the meeting itself.

Over an extended time-span a student creates and maintains an electronic collection and presentation of resources and information about themselves and their work. That is an e-portfolio. It can focus upon one aspect of the student's activities, for example a specific module or project. Or it might cover larger scales and collections of activities (a whole degree programme, or even a whole lifetime). A wider-scoped e-portfolio (course) might contain a collection of more specific e-portfolios (modules). At meetings with their personal tutor, the student presents selected aspects of their e-portfolio, combined into a reflexive narrative about their choices, actions, plans and progress.

There is a danger that the e-portfolio and the student's narratives will be skewed by the fact that digital text based materials are easier to collect. Extra technical and skills work may be needed to help with other formats, such as audio, video, still images and combinations of media.

It is tempting to think of patterns as equivalent to a catalogue of templates from which we can shop for solutions. **Design patterns should not be used as templates, they require the application of intelligence and creativity.** There is also a danger of patterns slipping into the perilous territory of the metaphor. **Design patterns are not metaphors.** As Christina Hughes and Malcolm Tight warn (especially concerning the "doctoral journey" metaphor):

"One of the problems with the endemic use of a metaphor is that it becomes such an over-generalised term that it loses its capacity to convey what might be specific, and socially or experientially significant, within different contexts." (Hughes and Tight, 2013: p.765)

Hughes and Tight call for a less metaphorical understanding of the PhD. It should be known as various forms, with potential for more variation, in a way that respects each variation as a different assemblage of craft-work, connected through "the intellectual value of the thesis" as the "primary concern" (Hughes and Tight, 2013: p.773). Each instance might also redefine/redesign what that concern means. To describe a range of design patterns for PhD study would be to do just that. The power of patterns lies in their ability to bridge the gap

between concerns (the things a person cares about and wants to address) and practices (enabling and constraining a person to address their concerns) in a challenging way that encourages the co-evolution and adaption of all three elements: concerns (or context), problem and solution. In most educational contexts initiating and completing a project to address concerns involves bringing people together with related but different concerns and practices, and getting them to act together. This complexity cannot be addressed with a template, or resolved with a metaphor. Peter Goodyear argues that this is becoming a growing challenge as we move away from “formal and highly structured methods of instructional systems design” in which the relationship between high level pedagogic beliefs, pedagogic strategy and pedagogic tactics is becoming more “loosely coupled” (Goodyear, 2004: p.340). The design change is then a negotiation between these complex positions. Goodyear describes this (echoing Schön) as:

“...a fluid process, involving a conversation between the pedagogical beliefs, knowledge and intentions in the mind of the teacher-designer and (provisional) design commitments.”
(Goodyear, 2004: p.341)

But it's actually more complex than that, where collaborations of teachers in a teaching team and students are added to the mix - what Goodyear and Ellis describe as an “ecology” (Ellis & Goodyear, 2010). Goodyear's paper on design patterns positions the pattern as an essential heuristic design device sitting between (pedagogical) concerns (or teaching ‘philosophy’) and practice - an essential assistance in the ‘fluid process’ of negotiating between the two aspects. He is exactly right. Design patterns are used by designers to efficiently encapsulate a range of what they call “design positions” and “movements” as an aid to dialogue with participants, the problem, the materials and their own creativity (Schön, 1986: p.291). The **Flipped Classroom** is a hugely successful learning design pattern that illustrates perfectly how patterns work as “design positions” and “movements” sitting between dynamically evolving practices and resources (with their emergent constraints and enablements) and the concerns of participants (values, interests, worries, ambitions). “Flipping” (as it has become known) is a simple move, in response to students feeling too passive and getting too little opportunity to constructively develop and use their learning:

1. instead of using lecture time to deliver content and homework time for students to interpret and make use of content, “flip” the arrangement;
2. make use of new technologies to record content and allow the students to watch it in advance, embedded into other resources and activities;
3. use the lecture time for activities in which the students are much more active.

The idea is simple, and must be interpreted and re-invented for each new context. For example, every group of students is likely to have a different range of responses to the flipping, some of

which might be quite extreme. This has to be designed for. The contextual information plays an important part in this. It allows us to reflect upon differences between our context and the originary context, and to evaluate the consequences of these differences. It might also prompt a reconsideration of concerns, projects and practices. Reflection and creativity are necessary when designing with patterns. As Goodyear states in his useful paper on "Patterns, Pattern Languages and Educational Design":

"Describing the context for the problem and its solution avoids over-generalisation. In addition, patterns should teach. They should be written in such a way that they help the reader understand enough about a problem and solution that they can adapt description and solution to meet their own needs." (Goodyear, 2004 : p.342)

The design patterns approach has been successful in some design domains. In software development it has been an essential factor in enabling large teams (or open source networks) to create maintainable systems. Design patterns have played a significant part in the evolving maturity of the craft, from individuals operating in isolation on a trial and error basis, through to today's sophisticated and well managed (but still creative) industry. The developmental potential of the design patterns approach makes it attractive as a strategy for academic technology and academic practice advisors - with the addition of a *communities of practice* dimension that exploits the patterns ability to "allow all members of a community or design group to participate in discussions relating to design". (Mor and Winters, 2007: p.66)

The case studies project was tentatively designed with a three-stage strategy in mind to use design patterns to overcome the limitations of the catalogue survey approach. In the first stage, interviews with academics and their support staff would discover or extract trusted design patterns. The patterns should be of three types:

1. patterns describing academic practice itself;
2. patterns describing the projects used to achieve change;
3. patterns for describing pattern generation.

In the second stage, each pattern would be evaluated and refined so as to create a set of sufficiently flexible and widely relevant patterns. Design research (or pedagogical research) plays an important part in this. We can use experimental and analytic methods to test and refine patterns and their implementations. In the third stage the patterns and example implementations would be communicated widely across the university, looking for further opportunities to work with academics to adopt-adapt the patterns. This would then be repeated in further iterations, building a *communities of practice* around the patterns and a *pattern language* (the term for a collection of interrelated patterns). Over time the strategy would build an increasingly large body

of verifiable knowledge and practice, emergent from and embedded in the widely diverse contexts of the university. We would know about the applicability of each pattern, its fit with contexts and other patterns (or how much work is usually needed to make it fit), its adaptability, and the collective capability for implementing and sustaining it (including the necessary support infrastructure and technologies). Formal assessments of design patterns and implementations would also more easily draw upon design research studies (for example, work on flow and cognitive load). The *developmental* question is elegantly answered:

- over time, working with communities of practice, we develop a repertoire of design patterns that are clearly stated, flexible, relevant and effective;
- we enhance our collective capability (including academics, their support staff and students) to discover/create, use and review patterns - this is especially useful for those new to higher education (including students), who may otherwise struggle to understand the options available to them;
- we develop a sense of quality based upon the design patterns - we can evaluate the quality of the choice of patterns (how well they fit, stick, spread and grow) and the relative quality of a specific implementation of a pattern - this performing an essential role in "a system of continuous internal review which is 'firmly rooted in the intellectual life of the institution'" (Greatrix, 2007: Kindle location 7268);
- the technologies and services that we provide or recommend are tuned to better implement our set of good patterns, and can be evaluated against the patterns;
- design change and innovations, including changes to technologies, can be enframed by an understanding of the patterns that are in use, giving a better understanding of the gap between novel and everyday practice, aiding risk management, and supporting transitions (both expected and unexpected);
- the scope of the pattern language should correspond to the dominant concerns of the communities that they serve - this mapping should prompt and focus a dialogue about those concerns and a debate about priorities.

4. Reading the Case Studies

No matter how convincing the design patterns approach might seem *in theory*, we still need to answer the question: will it work here? The three part strategy described above (discover, evaluate and refine, disseminate) has to get over the first hurdle: will patterns emerge out of the case study interviews? And what kinds of pattern? - of the three types:

1. patterns describing academic practice itself;
2. patterns describing the projects used to achieve change;
3. patterns for describing pattern generation.

The aim, to reiterate, is to discover patterns that might be of use in *designing*, patterns that have the potential to inspire designers (including teachers and students) to invent new designs. It is not a simple empirical account, but rather a creative-constructive strategy, undertaken with some imagination. My reading of the case studies will produce a set of patterns, but it's not exhaustive. Other readings might produce different patterns. In reality design change and innovation are highly complex processes, rarely structured according to the rules of project management. This complexity is present in each of the 24 case studies, but with interesting variations. When reading the case studies, we should be aware of the multiple dimensions of change that might break the protagonists and their participants out of one set of conditions and lead to the eventual *homeostasis* of the new design, or at least to a position that is still evolving but looking in some way more promising.

On each case a collection of change agents will have collaborated, with a degree of coordination that might be loosely or tightly coupled. Peter Corvi's case illustrates how a close-knit complementary relationship between teacher/designer and technologist/designer can evolve to fit and enable stick, spread and growth - and how that effective emergent design (the collaboration) makes the development of further effective designs (the adaption of the forums technology in the MyWBS VLE) more achievable. These relationships may be ordered hierarchically, horizontally or in some other form. There was a clear predominance in the cases of informal vertical collaborations (with academics learning more from students than from each other). Information about potential design elements might "diffuse" to the change agents through centrally managed *diffusion of innovation* pathways (as described Rogers, 2005), or through *communities of practice* (Wenger, McDermott and Snyder, 2002). Alternatively, as in most of the case studies, innovations spread more chaotically, with little effective coordination - through vertical pathways and then only after that spreading horizontally. Russell Stannard's case illustrates how an academic might slowly discover and refine a problem over a long period, then suddenly find a technology that fits the gap, develop significant new practice (interactively with various groups of students), and achieve fit, stick, spread and growth - but without much

horizontal spread of practice in the institution (but spread did happen outside of the institution). Roles and responsibilities within a design change initiative may also vary, being intentionally demarcated so as to exploit human resources in a rational way, or there may be no such organisational design (the collaboration between Peter Corvi and Michael Eardley emerged as an aside rather than according to the plan on the org-chart). And all of this may change more or less randomly over time. Resources and people may become available as the result of appointments to a project, a conscious search, informal networking or just by accident. Whereas in some kinds of organisation design change is the responsibility of specialist teams, working to regulated and managed project structures, and using dedicated spaces and tools (physical and online), the case studies illustrate a more *ad hoc* approach, often relying on serendipity to overcome obstacles. Success is not systemic.

Serendipity plays an important part in many of the cases. This is not to say that the eventual success was random, but that some lucky encounter with an idea or a potential design element either removed a significant barrier or acted as a catalyst. In each of these cases the innovator employed strategies to make these discoveries more likely. Han-na Cha (formerly of Student Careers and Skills) describes how she asks her students to research new ways of learning. This resulted in the discovery and adoption of a technology enhanced practice in teaching speed reading. Han-na's strategy cannot guarantee success, but it does bias the probability that a new design will be found that fits with the students, sticks and spreads (as it did). It also has the collateral benefit of encouraging the students to reflect upon the tools and methods that they use to learn and the learning process itself. This is the beginnings of a pattern. It needs a good title. Something like ***Challenge the Students to Find Better Learning Designs***. We might then come up with a range of alternative ways to implement the pattern. For example, it could be done as a competition. Design research could be undertaken on these alternative patterns and implementations, so as to discover which ones work best in which contexts.

Nadine Holdsworth's case study from Theatre Studies illustrates what is perhaps a more radical approach related to this. Through reflection on her own module, within the context of a close-knit department that is 'naturally' reflexive and designerly (derived from the discipline), Nadine defined the challenge that would need to be addressed: "we had become too entrenched in the traditional module format as a way of eliciting responses, as a way of ensuring some student engagement". This dependency had to be reversed. Theatre Studies students should be able to actively set the agenda of their creative and academic work, so as to encounter and respond to the challenges and opportunities that reveals. They now set the agenda in Nadine's module by creating a performance plan that is sufficiently challenging so as to then raise good intellectual questions for the student to answer. This is not simply an intellectual exercise, the students are part of the active exploration and creation of space and place (some of the ideas they create in their projects have been implemented for real). They are directly part of what Amin and Thrift

call "the 3Rs of urban life: new social relationships, new means of representation and new means of resistance" (Amin & Thrift, 2002: p.48). The students success then depends not only on their ability to answer questions but also on their ability to *design* a challenge that raises interesting questions with impact beyond the classroom. We might call this approach something like ***The Student as Disruptive and Reflective Innovator***. Significantly, the approach was adopted as a way to enrich the discipline and the department. It succeeds because it is embedded within a department that already has an innovative designerly culture, with a sense of openness to the world beyond the university, that is able to accommodate and build upon radical innovations - the sharing of practice and responsibilities is done in an open and supportive way, especially within the assessment process.

Nadine's case study illustrates how closely integrated Type 2 patterns ("patterns describing the projects used to achieve change") can be with Type 1 patterns ("patterns describing academic practice itself"). Students are engaged as agents of change, as a method for change and as a pedagogy. Paul Taylor's account of *Students Developing Modules with IATL* illustrates how the Institute for Advanced Teaching and Learning (IATL) thinks in this way about the relationship between learning and developing educational practice. From Paul's perspective, the institution and its practice are co-constructed by staff and students over time, with students leading the construction. And most importantly, taking on this responsibility and doing the designing, leading and construction is a key part of learning in higher education. This is familiar to many as the *Student as Producer* perspective (see Neary and Winn, 2009), but with the consequences of what it means to be a producer expanded out to include leadership and design agency. Student as Producer might best be described as a design value, around which we can position a range of design patterns that help us to realise this higher ambition. And we can also describe a high level ***Student as Producer*** pattern describing best practice in doing Student as Producer. It also has the effect of dissolving the difference between Type 1 and Type 2 patterns. In Student as Producer the students learn by taking on a responsibility to define how they learn. This is more than just an academic apprenticeship in the narrow sense (Student as Researcher). Academics construct academia. Students as Producers are part of that construction business.

Three further *Student as Producer* related cases were encountered: Renske Doorenspleet's "Student Film Making in Politics and International Studies", Kate Astbury's "Students As Researchers Leading Digitisation in French Studies" and "The Beginnings of Empire, Online Coin Catalogue in Classics. Kate and Clare's projects, separated by 7 years, are remarkably similar. In each case the students create a catalogue of historical resources that significantly enrich the teaching and the wider research community's access to materials, using digital technologies. There is a little more to it than that. In each case the students take up a degree of leadership over the selection and use of the resources: a ***Student-Researcher-Led Online Catalogue Creation***. Clare has an interesting spin on this. Students and staff in Classics

choose a “coin of the week” from the catalogue (or to be added to the catalogue). They write a blog article about the coin. A ***Building a Story From an Artefact*** pattern (this is common in Classics, Kevin Butcher has made some great videos in this genre). Renske Doorenspleet’s case is also about story creation, but has a much more radical *developmental* aspect. Renske has transformed her *Core Issues in Comparative Politics* undergraduate module, and to some extent her own identity and practice as a researcher, by embracing the investigative and provocative short film genre. The module in its current format has been run successfully twice, and is about to enter its third year. And yet it still seems to be a high risk, unpredictable, but *fresh* undertaking. And that’s the point of it. The students respond to a fairly open brief challenging them to make short films about democracy. It feels like anything might happen. The film making process has a transformative effect on the students and the module. It is capped-off with an event that is somewhere between a small academic conference, a film festival and an activist gathering. It has a strong sense of community, but its not entirely clear what kind of community - in fact it brings community and democracy into contention. The contention includes uncertainty over the roles of the teacher, the professional film maker (an expert gives advice and feedback), technology, and the network or global movement of activism. This challenging and uncertain form brings the students in direct contact with the “*new forms of human sociality*”, mediated by new ways of communicating and making, described by Amin and Thrift (2002: p.45). There is a pattern to be found here, but it’s a really unusual and challenging one. Perhaps something along the lines of: ***Through Contention and Reflexivity the Making of the Story Becomes the Story.***

Many of the case studies demonstrate the role of risk in academic practice, and the part that technology and space-place plays in making things riskier and in channeling risky practice. George Ttoouli’s case study exemplifies this. It was a full-on ***Shock and Awe, Disorientate, Survive and Grow Stronger*** kind of event. Interestingly, it might be a one-off, having achieved a transformation in George’s pedagogy, he now has a more subtle approach. George made a huge investment of time and energy to create an event of such power, and then to bring the students through to the other side. The performance and creativity oriented spaces at Milburn House were key in creating the setting for the event. We might ask if such ***Keystone Experiences*** might play a bigger role in teaching more widely, and how we can support teachers and students in making them special using technology.

Some of the case studies illustrate the lengths to which academics need to go to achieve design change that seems obvious to them. Carol Rutter’s case study on “Making Space for Performance in Shakespeare Studies” describes a long route to success, with the creation and quite challenging development of an entire Centre (CAPITAL) with physical spaces, people and a culture all of its own - this is the kind of hard work that gets done, not simply to guarantee success in a deterministic fashion, but to *constitute* the right kind of place with the right kind of

contents and connections in which the aimed-for practices may flourish. This is a strong theme running through many of the case studies. Nick Monk's case study on the "Ramphal Teaching and Learning Spaces Refurbishment" is an extension of CAPITAL's work, spreading the design values and practices to other disciplines as *Open-space Learning* (OSL) (Monk, Rutter, Neelands & Heron, 2011), and growing its capability to support a wider range of purposes and people. The same long-term strategy of *constituting* the right kinds of space is also present in many other cases, even when that is not the explicit aim. An especially surprising instance is to be found in Mathematics. David Mond talked about what I have termed "Kinaesthetic Experiences and OSL". That is *my interpretation*. For David, the practices he described are entirely normal and appropriate for mathematics: how the live experience of doing mathematics at the blackboard is crucial to the student's growth in and through the craft; how this is a physical and mental process, body language and kinaesthetics are important, expressing the flow and physical effort, the concentration and effort; how a linear tool like Powerpoint is inappropriate.

The key to reading the accounts from Carol Rutter, Nick Monk, David Mond, Paul Taylor and many other academics is this: their starting position is a deeply embedded set of design values (or what might get called "teaching philosophy"), held with conviction and motivating their immediate and long-term choices. We have to respect that, and work with it. The good thing is that these cases illustrate that such deep convictions do not prevent design change, but rather direct it along certain channels. Ken Sloan talked of the importance of knowing and appreciating the design history of the institution, of how design change is better when informed by a rich understanding of the past, along with an optimistic sense that we can improve things, through the right kind of collaboration:

"...well I know the institution well enough to know how not to break it...there's often a classic sense of re-invention, which is a sense that "I'm new, I came in, this is my period, and I will not be constrained by the past". But you don't have to be constrained by the past, but you do have to understand it."

Reading these cases suggests ways in which academics experiment with alternatives in relation to their design values over time, changing practices with a keen appreciation of what fits, what will stick, spread and grow, and developing their deeper convictions through an informed experimentation and reflection. How can we characterise these ways of changing? The *designer's move* is to suggest a pattern. Something along the lines of ***Playing With the Fancy Dress Wardrobe to See What Fits***. The idea is this: the places in which teaching or research happens vary greatly, not just physically but also as a place within a dynamic network of people and resources; how can I know if a different place (for example Powerpoint) fits with my essential deep core concerns?; some places will obviously not work, some will fit perfectly,

others may lead to unexpected advantages or disadvantages; the only way to know is to try it out and see. But there's always a risk, and there are ways of managing the risk: try it out for something less important; get a friend to try it out (or a naive postdoc). This is best undertaken as an optional activity, but often academics get little choice (Carol talks about the various inappropriate spaces she had to put up with). But if you can get your own *Fancy Dress Wardrobe* to play with (CAPITAL), you're onto a winner. And if that design experimentation is enframed with a reflexive capacity and sense of design history, as with Rutter, Monk, Taylor and Mond, it will lead to the development of people with the effective and well founded design convictions that we see in these very successful academics. That then is another nascent design pattern, and a challenge: how can we enhance access to and use of this pattern?

Peter Abrahams of Warwick Medical School understands the importance of a good *Fancy Dress Wardrobe*. Peter's case study on "Multimedia, multi-modal teaching of anatomy in WMS" actually covers a range of cases connected by an impressive reflexive narrative (this is a common thread amongst the National Teaching Fellows). The narrative goes all the way back to childhood, and extends forwards into Peter's future work as *Emeritus Professor*. His *Fancy Dress Wardrobe* includes all kinds of props and media, ranging from actual costumes used on stage in lectures to sophisticated and very successful apps on the iPhone/iPod. Peter clearly stated the key design value behind this: *use whatever works for the students*. And his method: *keep looking for tools and props with new potential, be prepared to take risks, understand how to make engaging learning experiences, know the audience...all of the attitudes and techniques of the creative industries*. There are many patterns implicit in Peter's approach and productions. A film making approach is an important element. Peter has been making films since he was young, and cross-pollinates patterns from that discipline into his medical teaching. Many of the interviewees described how they draw upon creative craft and designerly capabilities from other aspects of their lives. Peter was especially clear on the importance of this. Also apparent, and of huge importance in understanding how people innovate and how innovations stick, is the fact that ***Peter really enjoys what he does and trying out new approaches - an important lesson for anyone trying to encourage design change and innovation***. But this sense of fun is enframed with a focus on the immediate outcome (for the students) and a global sense of *fellowship* with other educators, founded upon an well developed reflexive appreciation of the self.

The role of fellowship in enframing academic development, and design patterns for developing fellowship, needs to be explored more. It might be the case that where an academic has a strong sense of craft developed reflexively through fellowship they find it easier to bring other crafts into use, for example film making. **The connection between fellowship, craft and innovation is potentially significant.** Richard Sennett work on craft supports this, arguing that there is a common experience and moral value developed through craftwork that

can be a means for a common appreciation of craft between crafts (Sennett, 2009). In Peter's case we can see the importance of his appreciation of teaching and film making as valuable crafts that can contribute to each other. A challenge for learning technology is the question of whether it is a craft in itself, and then how to allow academics to participate in that craft while at the same time being academics. The *Higher Education Academies* trans-disciplinary fellowship framework offers a good starting point. The *Learning and Development Centre* at Warwick are redesigning their staff development work around the Fellowship of the Higher Education Academy (FHEA), having achieved success with the competitive National Teaching Fellowships Scheme (NTF).

If the pattern discussed so far sound like fun, that's probably not an entirely realistic description of the actual experiences of most of the interviewees. Most academic activity happens within spatial and organisational structures that are generic and non-configurable. This non-configurability might be hard-coded into the structures. Alternatively the constraints are embedded in social norms:

"I can't change this because it will impact on other teachers".

Sometimes this takes the form of:

"I can't change this because I can't make my colleagues feel that I expect them to change it too."

This is not irrational. Consistency and continuity matters for staff and for students. These conflicting forces are currently being experienced in Warwick's Moodle roll-out project. Stephen Brydges (the Senior Academic Technologist who has steered the roll-out from its inception) describes how whole-department implementations (usually pushed through from the top-down) are easier than piecemeal implementations (where individual teachers move to Moodle with little departmental coordination). Some academics have expressed a reluctance to try the new approaches unless they are adopted consistently by their colleagues. In one case (not documented in the case studies), a teacher introduced a self-funded Moodle platform into their own teaching only to find a creeping adoption of it by other teachers - and a consequent rapid growth in their own responsibilities for supporting it (a double-edged sword): the irresistible force of a plane of consistency self-organising! Similarly, the Open-space Learning and Ramphal Refurbishment projects have had to deal with the physical and social challenge of continuity. The furniture in the Ramphal rooms has been chosen so that it's layout may be reconfigured in just a few minutes, or removed entirely (by people who know what they are doing). The very idea of this still caused friction with a minority of teachers, whereas others are very happy. The Ramphal strategy might even be benefitting from a cognitive bias that has been called "The Ikea

Effect: When Labour Leads to Love" (as described in an influential *Journal of Consumer Psychology* article by Norton, Mochon & Ariely, 2011). At least to begin with, to aid the design achieving "stickiness", student assistants have been employed to help adapt the layout to each subsequent use. But as the *Ikea Effect* predicts, there might be more to be gained from staff and students satisfactorily creating configurations as the result of their own labour.

In an ideal world, we would find ways to optimise the reconfigurability of spaces and organisational structures, without impacting beyond the session for which the reconfiguration is made. There is a well known pattern for this, borrowed from software development. It is called the **Decorator** pattern. The idea is simple. We make many instances of a generic class (a room, an online course), with a built in ability for the instances to be decorated without any inter-instance impacts, and for instances to be passed around and redecorated. The Ramphal designs, described by Nick Monk, strive for this pattern. Unfortunately furniture design and other technologies are not quite up to the task yet. But we should actively think about space, furniture and digital technologies that can support it better (the Experimental Teaching Space in the Teaching Grid at Warwick has some potential for this). The success of the Ramphal Refurbishment was made more likely because the architects (Berman Guedes Stretton), IT Services (and their Audio-Visual team), and other support services adopted an attitude that was sensitive to these needs. In the long run the *Decorator* pattern also has a very significant development benefit. It can enable the *Fancy Dress Wardrobe* pattern, thus allowing people more of an opportunity to try out different designs with lower risk and consequently reflexively develop a stronger sense of their own design values (to grow more design-aware people like Carol Rutter, Nick Monk, Paul Taylor and David Mond).

A different approach to coordinated change was encountered case studies might be termed the **Kickstart a Community of Practice** pattern. It draws from the basic model of *expert knowledge and identity construction* described by Etienne Wenger *et al.* (see for example Wenger, McDermott and Snyder, 2002). Two of the interviewees explicitly referenced Wenger's model. The approach attempts to be *constitutive* and *empowering* at the same time. The community *empowers* people to take responsibility for designing their professional practice and developing expert knowledge. And in return the process of collaboratively designing and thinking develops the community. This might be especially important when an organisation needs to respond to significant challenges by drawing upon its own resources and developing its own unique response (rather than importing a solution).

Teresa Mackinnon's case study on "Creation of a VLE Platform and Community of Practice in the Language Centre" is more about community of practice than technology. **It is important to look well beyond the VLE itself to the face to face collaborations that focus on teaching development through the proxy of the new technology.** Teresa's strategy was to remove

technical barriers to participation in the use of technology and new practices by introducing an easier to use common platform, focussing upon raising technology-enhanced practice (but not necessarily design capability) to a common baseline. The VLE's role is relatively light, providing a place of orientation for the construction process. Perhaps "the production of a new locational machinery" (Thrift: 2008: p.98), what Thrift calls "the *inhabitable map*" in which:

"space itself becomes a means for conveying information and communication - actual qualities loaded with affective as well as cognitive value - with the goal of *approximating the rhythm of thought*, rather than simply a material template through which information and communication must be conveyed" (Thrift, 2008: p.98).

This is a common reasoning behind VLE implementations, with or without the *community of practice* concept. The participants in this case, the language tutors, are to begin with more tightly coupled than the users of the CAPITAL and Ramphal Spaces. In the case of the VLE, knowledge about the community is encoded/stratified through the arrangements of roles and resources into 'traditional' patterns or templates: "functioning as a kind of electrical infrastructure of attention, producing associated commonplaces" (Thrift, 2008: p.96). Whereas the Ramphal Space is set up to destratify and open-out the process of encoding "commonplaces" (Nick Monk is also exploring the use of "commonplace books" and the practice of "commonplacing" as a more register for the student's productions of reflexivity and reflexive subjectivity). The face to face activities relating to the introduction of the VLE might have mitigated this. However, it might be the case that the *Communities of Practice* pattern, when implemented through a VLE or similar technologies of space, has a *diversity reducing* effect, whereas the *Fancy Dress* pattern is more diversity friendly and sustainable, with very different people finding their own ways to be comfortable and to make the most of the new spaces. The important thing is to know what kind of outcome we are trying to encourage, and design towards that outcome. However, even then designing a community, or designing to encourage stronger community, is not easy. As Bronwyn Stuckey and Sasha Barab state in their chapter on "New Conceptions for Community Design":

"Experience clearly shows that 'good design' in socially oriented environments is neither a prelude to community nor enough in itself to stimulate and support community. If designers, managers, and facilitators are to succeed in capitalizing on what online community affords, they need to adopt new conceptions of what it means to design for community." (Stuckey & Barab, 2007: p.440)

Or as it translates into the terms of this investigation, we need design patterns that are more granular and precise about "community" and "practice". The case studies described by Rutter, Monk, Mond and Taylor certainly involve the creation (or emergence) of community, but it is a

very different kind of community to that imagined in *communities of practice*, which as Nigel Thrift argues, is a dangerously under-developed notion approximating in practice to:

"A kind of instrumental phenomenology which can produce subjects that disclose the world as uncertain and risky but also able to be stabilized (in profitable ways) by the application of particular kinds of intense agency that are creative, entrepreneurial and businesslike." (Thrift, 2005: p.98)

Thrift's point should ring alarm bells. When we think of *communities of practice* in naturalistic terms we forget that the techniques and technologies used are in fact as much the producer of new subjectivities as they are natural products of existing ways of experiencing-thinking-acting. This might be harmful, or just fail to connect. In reality there are a variety of types of relatively independent communities intersecting, including "bunds" (interest groups not aligned to location or employment) and "'light' socialities" (Amin and Thrift, 2002: p.45) - types of community that seem to fit more closely with the academic experience described in other case studies. The case studies certainly indicate the presence of a greater variety of communities, and certainly not classic *communities of practice*. Liz White's case study from the Centre for Lifelong Learning (CLL) represents the process of attempting to *kickstart the community of practice* at a much earlier stage. A catalyst for forming the community might emerge (a technical platform, a social platform or both), or alternatively it might provide a *Fancy Dress Wardrobe* for more loosely coupled individuals, who come together in a kind of light sociality. CLL's approach is more tentative and reflective-reflexive, being consciously oriented to the creation of organisational learning as much as actual practice. As such it might offer a valuable opportunity to design patterns for community in a more precise way, and subsequently apply technologies more accurately. It might also tell us something about the conditions in which a more open, reflective-reflexive design process occurs. The Language Centre is more narrowly focussed upon the function of enabling students to attain mastery of languages, and the need to adapt to other businesses and communities eating away at that core business. The Centre for Lifelong Learning has a more diverse and entrepreneurial base, responding to and pursuing opportunities for developing new and old business from a broad spectrum of sources. As such, they might be closer to a world in which, as Nigel Thrift describes:

"Numerous businesses are trying to set up communities in which passions can be more skillfully generated, in which the world is allowed to speak more forcefully to them, and in which the product can become a process swiftly completed." (Thrift, 2008: p.100)

Of the departments appearing in the case studies, there is one that seems to be especially close to this business of what Thrift describes as "worlding" (Thrift, 2008: p.97):

“..the practices of worlding require a different form of production of space, one which involves a process of constant recursive survey and interrogation which is internal to the practices of community formation and which simultaneously involves the production of spaces.” (Thrift, 2008: p.102)

We might think of creative writing as being about the production of individual creative subjectivities: the author. But as George Ttoouli's case demonstrates, there's much more to the Creative Writing Programme at Warwick than that: the author lives within productive spaces-places, and intensifies that life by making new spaces-places (real and in the text). George describes a transformative teaching-learning experience in which a rich interplay of components (technologies, people, sounds etc) are assembled into an event:

“...becoming a spatialized matrix of becoming, a continuously unfolding field, a surface for making provocations which, though calculated in all kinds of ways, can have open outcomes.” (Thrift, 2008: p.98)

This relates closely to what was earlier described as ***Through Contention and Reflexivity the Making of the Story Becomes the Story***, regarding Renske Doorenspleet's film making in Politics and International Studies. As with Renske's case, the design change is continuous and complex, disrupting default practice, prompting rethinking and dialogue, and generating new subjectivities and knowledge. George's case is a snapshot of a continual process of this kind, but focussed into a single highly-designed event, intensely disruptive and punctuating the student experience - against or out of which a community grows (in one sense, a community of survivors). The aftermath is a modification of the paths that are taken by the students, amplifying their individual “passions” (using Thrift's term), or creating new passions - material and energy to be taken up and turned into positive creations in the wider ecology of the course. We might call this a ***Shock, Awe, Survive and Thrive*** kind of pattern. To what extent is this an unusual design? The abruptness and intensity of the disruption aimed for in George's case might be rare, but the basic pattern might be similar to that experienced by students in certain kinds of lecture - challenging, disrupting and setting students off on their own directions and into a wide range of academic and creative responses (whole academic careers might be built in response to such an event). The Writing Programme perhaps develops them to a greater intensity because of it having a more explicitly entrepreneurial mindset - with the writing of novels and poems as the business to be generated.

In her paper on “Pleasure, change and value in doctoral pedagogy”, Christina Hughes explores these kinds of dynamics as encountered and created in the PhD process, which surely sets the conditions from which academic careers and behaviours grow. Hughes argues that the transition signified by the PhD is:

“...a machinic rather than a linear process. Accordingly, we need to understand change in terms of a multiplicity of forces in motion rather than as a fixed movement from one condition to another.” (Hughes, 2011: p.622)

The term “machinic” refers to a complex non-linear process of production in which the means of production are produced, combined and activated at the same time. How does this relate to the experience of designing?

“In designing...things are made under conditions of *complexity*. Designers discover or construct many different variables. These interact in multiple ways, never wholly predictable ahead of time. As a result, a designer must fashion each move to satisfy a variety of requirements and can never make a move that has only the consequences intended for it.” (Schön, 1988 in Brody & Clark 2009: p.111)

But being a PhD students is not quite like being a designer (or at least this idealised notion of the designer). As Hughes illustrates through the case of a student (Sian), the PhD process is as painful and confusing as it is pleasurable, not always unfolding with clarity *at a deeper, more fundamental level* - as it involves the [re]making of the self within and against all kinds of social constraints and prejudices (gender, class etc). However, pleasure is a strong and sometimes decisive factor, even if it must be enjoyed cryptically:

“...pleasure is a force in the process of identificatory change that comprise this enormous shift” (Hughes, 2011: p.622)

And consequently, the aesthetic element of how we construct the PhD (and academia) and the constitution of its ecology, is an essential design issue - extending into the post PhD academic life.

5. Conclusions

It became apparent, quite early on in the programme of interviews, that:

- the University *is* as expected rich in designing, design change and innovation, undertaken by an exceptionally large number and wide range of people;
- there is an ethic of experimentation and reconfiguration emergent from and central to academic craft;
- a traditional *diffusion of innovations* model does not effectively describe the ways in which these changes occur, and cannot be used to control adoption/adaption of new practices;
- there is very little coordination of this, as an intersection of people and practices, and certainly not much interplay between design challenges as they get stated in different locations (perhaps there is too great a focus on showcasing novel examples, too little focus on actual problems);
- very few people have the opportunity to undertake, complete, reflect upon and build upon a set of inter-relating or contrasting design changes or innovations over time in their own practice (Carol Rutter, for example, did do this, but over the span of long career);
- although there are some common platforms, encoded in software (Sitebuilder, 'traditional' teaching spaces, the Ramphal and other new teaching spaces, the new Moodle implementation), administration and cultures, design change and innovation happens around these platforms, or in entirely unconnected places, with little feed-forwards into deep change (tending to what Ken Sloan calls the 'sculpture trail' pattern);
- design patterns would not easily emerge out of the case studies, the patterns named in my reading of the cases are vague, small in number and in need of much more development and testing.

This investigation began with the hypothesis that the ideas of *design capability* and *design capability enhancement* could be used to direct and evaluate the application of learning technologies across the full diversity of the university. At the heart of these ideas is the *generative use of design patterns*, and by implication, their creation/discovery, circulation, refinement and use in the evolution of services, technologies and communities. This certainly is a missing element. But the harder question is: why is *pattern-based* practice not more common? The case studies illustrate some instances where academics have achieved success in design, without an explicit *design patterns* approach, but only after long, painful, frustrating periods (sometimes stretching across whole careers). What is missing?

This report concludes by introducing an expanded idea of *design capability* and a set of *design capability enhancing* strategies that have been remarkably successful in transforming businesses and institutions in the United States. The strategies come from the IDEO design company. IDEO have used these approaches with their long impressive list of clients including GE, Apple, Samsung and Microsoft⁵. They have also disseminated the ideas through innovative business schools (especially through the close relationship between Stanford's D.School and its business school). IDEO's *Design Thinking for Educators Toolkit* is being used widely by schools and universities⁶. And their OpenIDEO social innovation platform is adding a crowdsourcing element to the *Design Thinking* approach. In short, the founding principle of the IDEO approach is the realisation that:

"Design is too important to be left to designers." (Brown, 2009: Kindle location 482)

And that means we have to:

"...put these tools into the hands of people who may have never thought of themselves as designers and apply them to a vastly greater range of problems." (Brown, 2009: Kindle location 90)

The role of professional designers (augmented into interdisciplinary teams, including ethnographers, artists, technicians etc) is to set up the right processes to prime, facilitate, allow "legitimate peripheral participation" and make the most of the efforts of the whole population.

Through exploring the literature on designers and designerliness, taking note of the wisdom of leaders such as Ken Sloan, and by reading the case studies with this in mind, we can describe:

1. what an effective designerly organisation looks like;
2. the design capabilities that need to be present and active so as to make it work;
3. how we can help people to be designerly both within projects and across projects over the span of a career;
4. what an effective designerly university looks like;
5. specific aspects of design capability that are suited to the university setting;
6. how we can help people within the university to be designerly in projects and beyond.

In so doing we can describe an expanded idea of *design capability* that fits, sticks, spreads and grows in this locality, as a statement of the threshold that is required in order for design, practice

⁵ <http://www.ideo.com/work/>

⁶ <http://designthinkingforeducators.com>

and people to flourish. This is essential for understanding and improving the ways in which the university creates/discovers and adopts/adapts better designs, especially in the domain of learning technology.

In a designerly organisation, structural components (technological, social, cultural, architectural etc) are coherently combined (and can be reorganised) into well designed assemblages (regardless of logistical division) that help all participants to practice their crafts, develop themselves and others, form and address concerns, form and complete projects, and develop the right kind of communities and capabilities for their needs. Where commonality of design matters more than difference, that translates into shared practices, but not in such a way that the possibility of change and diversification is closed. Where differentiation is more important, this can happen freely but not in such a way as to disrupt the wider ecology or to become unsustainable. In either case, we get designs that **fit, stick, spread and grow** in a way that improves individual and collective capability and enhances (or at least doesn't retard) the ability to keep developing designs. A designerly organisation has design processes applying design capabilities, in a systemic manner, to make sure positive change occurs in these ways. And at the same time, people and communities grow their own design capability in a recognisable, supported, valued manner. This growing design capability is a core aspect of everyone's career development.

A designerly organisation is founded upon some fundamental design capabilities, belonging to and actively used by all participants in the organisation's processes and places (whether they be responsible for big or small changes, or the maintenance of a process as is). There are skills involved in this. For example, the ability to quickly sketch a design (as a representation of form or process). But the actual skills used to achieve effective design vary considerably (in some cases storyboarding is a better skill to use than sketching). Instead we should think of design capability as the presence of conditions (skills, opportunities, ideas, social organisation etc) that enable three key aspects of design to occur: inspiration, ideation and implementation. Tim Brown (managing director of IDEO) describes the three aspects of design capability in his book *Change by Design* (Brown, 2009), summarised in his influential *Harvard Business Review* article "Design Thinking" (Brown, 2008). Tim Brown talks of these as being the three spaces of innovation. This is more than just an analogy. IDEO recommend establishing three interconnected physical spaces in which these activities occur. The spaces are like this:

Inspiration: In this space we build a rich picture of the organisation (course, module, or whatever scope we are working at), its people and practices, as they are, as people might want them to be, as they are becoming. This must be realistic, not just a showcase of nice stories. It is combined with stories and design examples from other organisations and domains that might usefully enrich the mix. In their analysis of the design capabilities of university teachers, Peter

Goodyear and Lina Markauskaite introduce the concept of “epistemic fluency” to describe how good teachers are able to inspire their designs by understanding how different ways of knowing are active in a teaching-learning collaboration (Goodyear & Markauskaite, 2009). The Inspiration Space is the place in which epistemic fluency (and other kinds of empathic design capabilities or fluencies) is exercised. It generates and refines the design challenges that drive innovation, by expanding insights into detailed accounts through observation. In the interviews with successful innovators at Warwick it was clear that they each had their own rich and detailed "inspiration spaces". However, this important knowledge remains largely locked away in their heads. The IDEO three spaces approach is a way of drawing out that wealth of experience and learning. Most importantly, the space has to be open and valuing of all perspectives. Empathy is a key product of the activities in the space, with all participants gaining a better understanding of each others' perspectives. IDEO post strict rules of behaviour at the entrance to the inspiration spaces that they set up in the buildings of their clients. The professional design team plays a facilitating role in this, using creative approaches (e.g. story-building), ethnographic methods, design research, documentary film making - whatever techniques add usefully to the mix. The Open-space Learning pedagogy developed at Warwick fits well with this. As some of the case studies demonstrate (especially George Ttoouli) and the literature confirms (especially Christina Hughes, Nigel Thrift) in a university in many significant cases the Inspiration Space will be quite a challenging space, tied closely to deep issues concerning subjectivity, identity, the individual and the community as produced and as producers. The role of students as participants in Design Thinking is more than essential. As has been demonstrated, the Student as Producer approach must include the Student as Designer and Leader in a non-trivial sense.

Ideation: the insights, observations and empathy created in the Inspiration Space should, often with careful facilitation, turn into design challenges. Ideas for responses to the challenges might emerge quickly, or we might need to prime ideation through the generative power of design patterns. In either case the aim of the Ideation Space is to generate a wide range of possible design responses, and to take them as far as necessary so that ideas can be appreciated and evaluated realistically. There are three essential ingredients to success in this:

1. a capability for creating and testing prototypes that are just good enough (lo-fi prototyping);
2. a sufficient deferral of issues concerning technical implementation, giving us room to think more freely;
3. the right kind of attitude, prepared to create ideas but not being too precious about their critical appraisal.

In all of this, speed is essential. Whereas we might slowly build the contents of the Inspiration Space over time, Ideation activities fit well with a workshop format. In an article entitled

“Prototyping is the Shorthand of Design” (Kelley, 2001), IDEO’s Tom Kelley describes what these workshops are like, and most importantly, the necessary environment and the way in which the Ideation Space facilitates lo-fi, throw-away prototypes becoming embedded into the wider organisational dialogue and memory, so that they can be recalled or reactivated as the exploration of the Inspiration Space grows. This is where design patterns fit. The nature of the Ideation Space is perhaps best encapsulated by Nigel Thrift in this description of new kinds of collaboration aiming to embed “systematic knowledge” (abstract design ideas) into tacit knowledge (design embedded into practice such that it fits, sticks, spreads and grows):

“...construct quick-fire 'instant' communities by drawing on bodies of understanding which allow these communities to both be founded and have grip, in particular by making systematic knowledge tacit through the various means systematizing tacit knowledge that can now be found and applied” (Thrift, 2008: p.91).

The challenge that we face in higher education is, as has been seen in the case studies, the kind of rapid fire experimentation, creativity and reflection/reflexivity required to make this work, is dissipated across many unconnected places and events, and only joined together loosely by innovators of the kind represented in the interviews. Furthermore, the Ideation Space (and the Implementation Space) must be able to draw as needed upon the rich data of the Inspiration Space. A Three Spaces approach, with physically preserved spaces containing all the work on a design investigation, is a way to gather this learning and creativity into one place.

Implementation: Finally, things have to get implemented. And this needs to be seen to be a reality right from the start of a design project. People will not participate without a strong likelihood that their work will have a result. The Implementation Space is perhaps more like a traditional Project Room, with engineers, project managers and change management. The separation of Implementation from Inspiration and Ideation is, however, essential for the kind of emergent, less constrained design and innovation ideas to emerge, to bubble-up into the Implementation Space, where the difficult process of making it happen, of acquiring and deploying systems and supporting change happens. We must not rush to decide on what should be implemented and how it should be achieved before sufficient work has been done in the Inspiration and the Ideation spaces. Once we do launch into Implementation, we need to keep revisiting the Inspiration and Ideation spaces to keep checking that we are doing the right thing, and to keep the difficult Implementation process fired-up with connection to and support from the community that it serves.

Looking at this from another perspective, in his book *The Ten Faces of Innovation* IDEO's Tom Kelley and Jonathan Littman talks about the richly varied but well integrated teams of different

people needed for successfully implementing these approaches - forming a full and cohesive design capability. Kelley arranges the ten faces into three personas⁷:

The Learning Personas:

Anthropologist;
Experimenter;
Cross-Pollinator.

The Organizing Personas:

Hurdler;
Collaborator;
Director.

The Building Personas:

Experience Architect;
Set Designer;
Storyteller;
Caregiver

These ten are well represented in the university, although perhaps rarely in the same team using their capabilities to full effect. Nigel Sykes (Warwick Business School) provides a similarly powerful analysis of the different kinds of "talent" necessary for successful innovation, further enriching the specification of design capability:

"The first is the characteristic of **'envisioning'** or the ability amongst an individual or group to conceptualise laterally. A second vital constituent needed is the ability to **'enable'** or to manage and coordinate activities. The third element, **'enacting'**, refers to the ability to carry out the work and bring it to completion." (Sykes, 2008: p.9)

For Sykes, the key is for people to recognise their capabilities and talents and for businesses to activate those talents with the right kinds of organisation, modes of working and activities.

Drawing this all together, a simple example illustrating how the Design Thinking approach works to enhance two dimensions simultaneously, the design investigation or project and the designerly community and career:

⁷ <http://www.tenfacesofinnovation.com>

We might get an idea that there needs to some development done to use technology to increase and democratise participation in seminars. That's not yet a fully stated design challenge, much more work has to be done; so we take that as the initial "frame" for the design investigation (as designers say). We set up the three spaces in an easily accessible location and start to bring people in or go out and observe. The inspiration space fills up with detail and we start to draw out the basics of possible design ideas. We prime the prototyping process with workshops, including a good range of students and seminar tutors, with activities that allow them to realistically build and test ideas. Over time the ideation space fills up and some designs (not necessarily a single solution) emerge as likely candidates around which a consensus builds. We invite the wider community in to evaluate the prototypes. Perhaps the prototypes first become hi-fi and we get people to use them in the field, observing their use to add further detail to the Inspiration and Ideation spaces. During the process there is a towards increasing implementations of designs (again not necessarily a single solution), as they are taken into the Implementations Space and made real. The success of the new designs (fit, stick, spread and grow) is more likely, given their emergence from a very wide community of participant designers.

At the same time, through a set of simultaneous or subsequent design investigations, along with design use and change in everyday practice, people develop, as individual careers and as communities (networks more or less loosely connected). Consider the case of an early career academic. They are adopting, adapting and even creating designs as part of the steep learning curve they face in building a career in academia. They might also participate with varying depths of involvement in Design Thinking activities, dipping into Inspiration Spaces to learn and to contribute, and perhaps taking part in the lo-fi prototyping of new design ideas for seminars. This could all happen in a disconnected and unreflected way. But as we have seen, design change and innovation are powered by designerly people connecting together their experiences over time, reflecting and building design values, projects and practices. Five things are important:

1. experiencing and remembering designs in use including the problems that they raise;
2. reflecting upon these many different experiences;
3. abstracting (formally or informally) patterns and generating new ideas;
4. sharing those experiences, reflections and ideas with others;
5. finding ways of putting ideas into practice.

What can we do to support this process of personal and collective development? Many of the innovators represented in the case studies have gone through the process of becoming a Higher Education Academy National Teaching Fellow. This involves writing a reflective-reflexive account of the additional work that they have done, their projects and innovations - work that addresses a framework of aspects of excellent teaching and learning, or in the terms of this

investigation, core design challenges. The prospective fellow's underlying design values (or teaching philosophy), and how these values translate into effective (excellent) responses to these design challenges, are amplified and expressed through this process of remembering, connecting, reflecting and defining. But this does not just happen in isolation. The National Teaching Fellowship is a "fellowship" of people who are all responding to the same set of design challenges (and feeding forwards into their evolution) but with their own design responses and style. Fellowship then develops great designers and at the same time a kind of community. The National Teaching Fellowship is restricted to 55 awards each year. More recently, the Higher Education Academy has created a second interrelated fellowship framework: Fellowship of the Higher Education Academy. This is open to all people in British universities. It uses a similar framework based approach, but with two key differences. There is no restriction on numbers. In fact some universities are aiming to get all of their teaching-related academic staff to achieve fellowship. Secondly, there is a system of levels, from Associate to Senior Fellow, extending the fellowship framework and its developmental work across almost the full length of an individual's career. **The key realisation is that the fellowship approach can connect into the Design Thinking strategy, with design investigations providing opportunities for individuals to build the necessary experience and evidence for fellowship, and the reflexive understanding developed through fellowship helping to form better projects and teams.** This might even be formalised, with opportunities provided specifically for prospective fellows to get involved in design activities, and to record and reflect within a developing portfolio. An interlinked web system might be created as a virtual host for design activities in the three spaces, with portfolio building built in - perhaps using an "open badges" design pattern. Ultimately, however, there is no simple formula for success. Rather, there is a long, iterative process of designing environments and support for design capability.

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Not all of these case studies appear in this report, but will form the basis of an extended study to form part of a PhD thesis.

References

- Amin, Ash & Roberts, Joanne. (2008) *Community, Economic Creativity, and Organization*. OUP.
- Amin, Ash & Thrift, Nigel. (2002) *Cities: Reimagining the Urban*. Polity Press.
- Brody, David & Clark, Hazel. (eds.) (2009) *Design Studies: A Reader*. Berg.
- Brown, Tim. (2008) "Design Thinking" in *Harvard Business Review*, June 2008.
- Brown, Tim. (2009) *Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation*. Harper Collins, Kindle edition.
- Cross, Nigel. (2007) *Designerly Ways of Knowing*. Birkhäuser.
- Ellis, Robert & Goodyear, Peter. (2010) *Students' Experiences of E-learning in Higher Education*. Routledge, Kindle edition.
- Goodyear, Peter. (2004) "Patterns, Pattern Languages and Educational Design" in ASCILITE 2004 Conference Proceedings.
- Goodyear, Peter & Markauskaite, Lina. (2009) "Teachers' design knowledge, epistemic fluency and reflections on students' experiences" in *The Student Experience: Proceedings of the 32nd HERDSA Annual Conference, 6-9 July 2009, Darwin, Australia*.
- Goodyear, Peter & Retalis, S. (2010) *Technology-enhanced learning: design patterns and pattern languages*. Sense Publishers.
- Greatrix, Paul (2005), *Dangerous Medicine: Problems With Assuring Quality and Standards in UK Higher Education*. University of Warwick.
- Hughes, Christina. (2011) "Pleasure, Change and Values in Doctoral Pedagogy" in *Studies in Higher Education* Vol. 36, No, 3, 621-636.
- Hughes, Christina & Tight, Malcolm. (2013) "The metaphors we study by: the doctorate as a journey and/or as work" in *Higher Education Research and Development*, 2013 Vol. 32, No. 5, 765-775.
- Kahneman, Daniel. (2011) *Thinking, Fast and Slow*. Penguin, Kindle edition.
- Kelley, Tom. (2001) "Prototyping is the Shorthand of Design" in *Design Management Journal*, Summer.

Laurillard, Diana. (2012) *Teaching as a Design Science: Building Pedagogical Patterns for Learning and Teaching*. Routledge, Kindle edition.

Lave, Jean & Wenger, Etienne. (1991) *Situated Learning: Legitimate Peripheral Participation*. Cambridge University Press.

Lawson, Bryan. (2005) *How Designers Think: The Design Process Demystified*. Routledge, Kindle edition.

Rosemary Luckin, Sadhana Puntambekar, Peter Goodyear, Barbara L Grabowski, Joshua Underwood, Niall Winters (eds.) (2013). *Handbook of Design in Educational Technology*. Routledge.

Mor, Yishay & Winters, Niall. (2007) "Design Approaches in Technology-Enhanced Learning" in *Interactive Learning Environments*, Vol. 15, No. 1, April 2007, p. 61-75.

Norton, Michael. Mochon, Daniel. & Ariely, Dan (2011) "The Ikea Effect: When Labour Leads to Love" in the *Journal of Consumer Psychology*, Vol 22, No. 3, July 2012, p,453-460.

Nussbaum, Martha. (2011) *Creating Capabilities: The Human Development Approach*. Belknap Press of Harvard University Press, Kindle edition.

O'Toole, Robert. (1997) "Contagium, Vivum, Philosophia: Schizophrenic Philosophy, Viral Empiricism" in Ansell Pearson, Keith. *Deleuze and Philosophy, the Difference Engineer*. Warwick Studies in Philosophy and Literature, Routledge.

Rogers, Everett. (2005) *Diffusion of Innovations, 5th Edition*. Free Press, Kindle edition.

Schön, Donald. (1986) *Educating the Reflective Practitioner: Toward a New Design for Teaching and Learning in the Professions*. Jossey-Bass, Kindle edition.

Schön, Donald. (1988) "Designing: Rules, Types and Worlds" in *Design Studies* 9/3 1988, 181-184.

Sennett, Richard. (2009) *The Craftsman*. Penguin, Kindle edition.

Simon, Herbert. (1996) *The Sciences of the Artificial, 3rd Edition*. MIT Press.

Stuckey, Bronwyn & Barab, Sasha. (2007) "New Conceptions for Community Design" in *The Sage Handbook of E-learning Research*. Sage.

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Sykes, Nigel (2008) "Envisioning, enabling and enacting: metamorphosing the enterprise P3 diagnostic", working paper. Warwick Business School, University of Warwick.
www2.warwick.ac.uk/fac/soc/wbs/research/ei/research/working_papers/wp92.pdf [Accessed 24 September 2013]

Thrift, Nigel. (2008) "Re-animating the Place of Thought: Transformations of Spatial and Temporal Description in the Twenty-First Century" in Amin, Ash & Roberts, Joanne. (2008) *Community, Economic Creativity, and Organization*. Oxford University Press. p.90-119.

Wenger, Etienne. McDermott, Richard & Snyder, William. (2002) *Cultivating Communities of Practice: A Guide to Managing Knowledge*. Harvard Business Review Press.