Developing and Sustaining a Culture of Innovation in Health Higher Education

Literature review

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Innovation in Teaching and Learning in Health Higher Education is a project led by the Council of Deans of Health in partnership with the Higher Education Academy. The project is governed by an Advisory Group with representation from both organisations.

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Foreword

Over the past two years, the Council of Deans of Health and the Higher Education Academy have been working together to explore, promote and disseminate educational innovation in health higher education across the UK. The Innovation in Teaching and Learning Health Higher Education Project has involved a range of work, including developing a database of case studies of innovative practice, workshops showcasing examples from universities across the UK and a first literature review scoping the range of teaching and learning innovations currently in practice in health higher education. We have found innovative practice in all home nations and across professions, both at pre-registration and post-registration level, ranging from the latest simulation technology, to engaging service users and carers in new ways, to new pedagogical approaches to learning and teaching.

As an Advisory Group, we know from our own experience of leading departments and faculties within universities that copying and pasting another institution’s practice is not straightforward; that organisational context and culture are vital to both developing new practice and making sure that it endures over time. However, it was apparent from early on in the project that work on innovation often focuses on specific initiatives or technologies rather than on the context in which they develop. This is a risk we have wanted to tackle head-on by making the culture required for innovation an explicit focus in the project’s second year.

I am therefore delighted that we are able to publish this review, which is focused specifically on exploring the literature around cultures of innovation in both health higher education and more widely. The findings have confirmed our initial instinct: that developing and sustaining a culture of innovation in health higher education is a rich subject and central to any long-lasting development and spread of new practice. In particular, the literature review’s theoretical framework, based on a modified 3-P model (Presage, Process and Product) signals a way to understand and explore the innovation itself, the environment in which an innovation is developed and refreshed and the wider context that supports innovation generation and dissemination.

Our hope is that this report will support colleagues and policy makers across the UK to better understand the conditions that enable new, imaginative approaches in education to flourish and help us push on to make teaching across our professions the best it can be.

Professor Brian Webster
Assistant Dean, Edinburgh Napier University and Chair, Innovation: Teaching and Learning Project Advisory Group
Summary

It is well-recognised that ‘innovation’ is difficult to define and there is a lack of consensus around the meaning of the term in the healthcare higher education literature. However, the wider literature supports the definition used by the Innovation in Teaching and Learning in Health Higher Education Project that innovation is “a new, sustainable approach that has led to an overall improvement in the student experience, and which is supported by evidence”. Taking this definition and building on the first literature review, this review had four phases.

First, the review team took all the articles identified in the first review and scrutinised them from the perspective of innovation culture, using a Kirkpatrick hierarchy adapted to evaluate the culture of innovation. Innovations that have an impact on organisational practice or result in wider changes in higher education practice and healthcare, for example, would be assessed at Level 4, while those that had been developed in action research in a local context would be Level 2b.

Second, the literature on cultures of innovation was reviewed. This demonstrated significant gaps in the evidence-base in healthcare higher education around culture of innovation. The literature in other areas of higher education and beyond higher education was therefore reviewed and a number of consistently important themes were identified. These included the impact of new technology; the importance of interdisciplinary perspectives and collaboration; critical reflection and scholarly communication; organisational vision, leadership, trust and reward; and the role of students and service-users as co-innovators.

The themes aligned with a Presage-Process-Product (3-P) theoretical framework that was developed and refined during the review process, allowing us to highlight the interdependencies between the different elements that may encourage or inhibit innovation. In the third and fourth phases of the review the review team tested this model through interviews and then used it to re-scrutinise the papers from the first systematic review.

In our 3-P model, the teaching and learning innovation (the Product) is developed within an environment that evaluates the impact on student learning and is continually refreshing itself in an enhancement-led manner (the Process). These are situated within a wider context (the Presage) that supports innovation generation, development and dissemination inside and outside the institution. Within and beyond the institution, innovations will need to be adapted and developed to suit the local context.

The review found that an environment that is most likely to foster innovation in healthcare higher education is one that encourages interdisciplinary and collaborative approaches, is enhancement-led and critically reflective, encourages new ideas and their development, and rewards staff for new approaches. Unsurprisingly, leadership is a key to creating such an environment, along with shared organisational vision that encompasses distinctive impact across and beyond the organisation. We found that creative individuals are usually able to work at the boundaries between disciplines. Innovation development requires identifying these connections and will also involve building curriculum design teams that include students and other
stakeholders, particularly service users. These findings therefore have implications both for universities as they seek to foster innovation and for other organisations, such as the regulators and policy makers that set the frameworks in which health higher education is delivered.
Background

The *Innovation in Learning and Teaching in Health Higher Education* project defines innovation as “doing something new in teaching and learning” and “a new, sustainable approach that has led to an overall improvement in the student experience, and which is supported by evidence”. The literature demonstrates that there is lack of consensus on the meaning of the term innovation.

The project was established to identify and disseminate curriculum innovations currently in practice across the UK in nursing, midwifery and allied health professional education. An earlier systematic review of the literature addressed the following questions:

- What conceptualises and defines innovation in healthcare education?
- How are cultures of innovation developed?
- What evidence of innovation exists?
- What are the barriers and enablers to innovation development and dissemination in healthcare higher education?

This first systematic review “scoped the range of teaching and learning innovations currently in practice across the UK within the education of healthcare professionals”, generated a plethora of examples of innovative practice published between 2010 and 2013 and identified a number of gaps in the research evidence (Dearnley et al., 2013). In particular, very few assessment or practice-oriented innovations were identified and there was a notable lack of an evidence-base around the culture of innovation. The reviewers recommended “further exploration of definitions and cultures of innovation”. They speculated that a “substantial range of innovative practices in healthcare higher education is not widely recognized as it lacks evaluation and subsequently adoption across the higher education sector”. A second literature review was therefore commissioned to consider:

- Concepts and definitions of innovation in healthcare higher education
- An analysis of how cultures of innovation are developed, that should include evidence from non-healthcare higher education settings
- An analysis of how cultures of innovation are sustained, embedded and extended
- An analysis of barriers and enablers to innovation development and dissemination in healthcare higher education

In commencing this review, we assumed that cultures of innovation are likely to be enhancement-led, and therefore encourage reflection, evaluation and scholarly dissemination. The extent to which this is evidenced in a report of innovation might therefore represent an evaluation of the culture from which it emerged. In this project we endeavoured to develop an evaluation tool based on the Kirkpatrick hierarchy (Kirkpatrick, 1967), which is regarded as a useful model in the evaluation of healthcare education. The Presage-Process-Product (3-P) model, originally devised by Biggs as a model of teaching and learning (Biggs, 2003), describes a complex system in which a change in one of the components is expected to influence the other components. We used this as a model of the culture of innovation in learning and teaching. The
development and use of both the Kirkpatrick and 3-P models are described in subsequent sections.

**Aims**

The primary research question was:

What is a culture of innovation? How does it develop?

The aim was to review the recent literature on cultures of innovation and summarise how they are developed, sustained and extended, including associated barriers and enablers, in a way that is relevant to healthcare higher education and can be used to inform future practice.

The following specific questions were addressed:

1. How is innovation defined and conceptualised?
2. How is an innovation developed?
3. How is an innovation evaluated and disseminated? What is the impact on the student experience, the staff, the institution and beyond the institution?
4. How is a culture of innovation sustained, embedded and extended?
5. What are the enablers and barriers to development of a culture of innovation?

**Methodology**

The review was conducted in four phases. In Phase 1 each of the articles identified in the first systematic review (Dearnley et al., 2013) was scrutinised from the perspective of the culture of innovation, using a modified Kirkpatrick hierarchy of evaluation. Phase 2 involved a systematic search of the wider higher education literature. Phase 3 involved discussions and interviews with experts, and identified further sources of literature. Phase 2 and 3 resulted in a modified 3-P framework. In phase 4 each of the articles from the first systematic review was re-scrutinised against this new framework. These phases were overlapping; informed each other (see diagram below); and outcomes are reported throughout the document in an integrated way.
Phase 1: Kirkpatrick evaluation of cultures of innovation in healthcare higher education

We assessed reports of innovation in healthcare higher education using Kirkpatrick’s hierarchy, which we adapted to evaluate the culture of innovation. This is illustrated in the following diagram and further details can be found in Appendix I.

The Kirkpatrick evaluation tool was first tested by two of the lead researchers. The 167 papers identified in the first systematic review (Dearnley et al., 2013) were then distributed to 12 reviewers who were all healthcare educators. A workshop was run to introduce the use of the modified Kirkpatrick’s hierarchy. The lead researcher also assessed every paper.

Reviewers were also asked to choose their “favourite innovation”, preferably one that they had assigned a high level on the Kirkpatrick scale from the perspective of the culture of innovation, and to briefly summarise the innovative practice, comment on the culture of innovation from which it emerged and note any enablers and barriers to development or dissemination of the innovation identified by the authors. The lead researchers scrutinized each paper again after review of the wider literature relating to cultures of innovation in higher education (Phase 4 described below). The results of these two activities (the choice of favourite innovation and a systematic scrutiny of each paper) generated exemplars, used throughout the report.
Phase 2: Literature review of cultures of innovation

Since this was a scoping exercise there were both systematic and informal elements to the review. We undertook a manual search of the papers from the following journals for the years 2003-2013.

The following journals were searched with the terms “culture” and “innovat***”

- Academic Medicine
- Advances in Health Sciences
- Education
- Health & Social Care Education
- International Journal of Nursing
- Education Scholarship
- International Journal of Practice-based Learning in Health & Social Care
- Journal of Continuing Education in Nursing
- Journal of Continuing Education in the Health Professions
- Innovative Higher Education
- Journal of Educational Evaluation for Health Professionals
- Journal of Nursing Education
- Medical Education
- Medical Education Online
- Medical Teacher
- Nurse Education in Practice
- Nurse Education Perspectives
- Nurse Education Today
- Nurse Educator

The following journals were searched with the terms “culture” and “innovat***” and “higher education”.

- International Journal of Business Innovation and Research
- Journal of Organizational Change Management
- Leadership & Organization Development Journal

ERIC was also searched with the terms “culture” and “innovation” and “higher education”. The reference lists of papers discovered in the above searches were additional source of primary peer-reviewed articles. Higher education experts outside healthcare education participated in discussions and interviews and were sources of additional articles. Papers were collated using the reference manager Endnote®.

The Presage-Process-Product (3-P) model (Biggs, 2003), was used as a conceptual framework. “Presage factors” included the context in which the culture of innovation sits, the characteristics of the organisation, its teachers and learners; “process factors” include the approaches to supporting innovation development, or how the community of innovative practice is developed; and “product factors” are the innovations, how these are disseminated and the impact that they have externally. Each of these is interrelated.

Phase 3: Discussions and interviews

The lead researchers met at regular intervals to discuss the literature and the conceptual framework. They met with the wider team of reviewers at the start of the project in a workshop to
introduce the Kirkpatrick evaluation tool and at the end of Phase 1 to discuss the outcome. Conversations with colleagues in the Business School, the School of Education and Human Resources helped with the development of our ideas and recommended additional literature. As we refined the 3-P conceptual framework, we tested these ideas in interviews with senior academics that are leading our own University (UWS) through extensive organisational change. We used the framework to analyse, link and present the results of the review.

**Phase 4: Cultures of Innovation in healthcare higher education**

The refined Presage-Process-Product framework (presented in Appendix II) was also used to scrutinise each paper from the first systematic review (Dearnley et al., 2013), again. The results of this process were examples that were used throughout the review, particularly in the section titled *Cultures of Innovation in Healthcare Higher Education*. 
Conceptions of Cultures of Innovation

What innovators report on culture: a systematic review

Papers from the first review (Deanley et al., 2013) were assessed independently by a team of 12 reviewers. Three papers were excluded from this review because they were not in English or not available to the reviewers. Thirteen reviews were also excluded from assessment. Five were systematic reviews that evaluated simulation-based learning (Cant and Cooper, 2010; Cook et al., 2013; Harder, 2010; Rosen et al., 2012) and team-based learning (Sisk, 2011). The other reviews were on the topics of digital media (Helle and Säljö, 2012; Anderson and Enge, 2012), including the smartphone (Ozdalga et al., 2012), the use of audience response systems (Mareno et al., 2010), interprofessional education (Abu-Rish et al., 2012), team-based learning (Timmermans et al., 2012), service user involvement in education (Terry, 2012) and arts-based learning (Rieger and Chemomas, 2013).

The remaining 151 papers were evaluated according to our Kirkpatrick framework (Appendix II). This first evaluation identified 46 (30%) at Kirkpatrick Level 1, 25 (17%) at Level 2a, 54 (36%) at Level 2b, 16 (11%) at Level 3, 8 at Level 4a and 2 at Level 4b (total 6% at level 4). A third of the papers were redistributed for review, but significant discordance in the assessment was noted. A second evaluation was therefore made by a single reviewer (the Principal Investigator). Included in this evaluation were all the papers that had not been evaluated by this reviewer in round one. Of the original papers, 130 were evaluated in this way (See Table 1). There was concordance in 32% of cases, and most of the time the paper shifted down the hierarchy at second assessment. Only 8 papers were assessed at Kirkpatrick Level 3 at second evaluation. Notably, two of these had been assessed at Level 1 at first assessment.

Table 1 Kirkpatrick Hierarchy for Culture of Innovation – assessment of 130 papers

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A dearth of papers reporting high on the Kirkpatrick scale means that it is not possible to draw strong conclusions in relation to the culture of innovation. Very few of the “innovations” were deemed completely new. At least 90% were innovations developed elsewhere that were “new to the environment” or were introduced and developed in a “new way”. Reviewers who were less experienced with the modified Kirkpatrick scale tended to be biased in their assessment and
overestimate the level. Although the culture of innovation was not explicitly discussed in these papers, in many it was possible to catch “glimpses” of the environment in which the innovation had emerged and examples are used throughout the following review. Few authors explained why they had applied the terms “innovative” or “new” to the learning and teaching environment.

**Concepts and definitions of innovation**

The wider review on cultures of innovation revealed only a handful of relevant papers in healthcare higher education. A number of papers were found by manually searching *Innovative Higher Education* and the ERIC database. These papers and a handful of papers identified by a colleague in the Business School referred to other relevant papers that were retrieved and are also referred to in the following paragraphs. It soon became clear that, although the words *innovative* and *entrepreneurial* are used increasingly in higher education, the language is derived from the business world (Mautner, 2005); and there appears to be no unified approach in higher education to definitions or to the study of innovation (Wolff, 2008). The literature from a variety of discipline sources is therefore integrated in the following review, which is organised according to the dominant themes that emerged from our exploration of the literature.

Most definitions of innovation in the literature focus on novelty or newness and “what is new, how new and new to whom” (Johannessen et al., 2001). An early description defined innovation as “the generation, acceptance and implementation of new ideas, processes, products or services” (Thompson, 1965, p. 2 cited by Hurley, 1995). Industry today has turned from a focus on efficiency and quality to high-impact innovation as a source of competitive advantage (Smith, 2006). In this context innovation is the creation and exploitation of new ideas (Kanter, 2000), “the conversion of ideas into commercial success” (Smith, 2006, p. 219). It is not surprising therefore that more recent definitions involve everyone in an organisation. “The correct definition of innovation is problem solving. It is the ability to see a need and to think creatively how that need might be met in a better way. That is, we apply technology–maybe new technology, maybe old technology–in novel ways to fashion that better way” (Price, 2007, p. 320). An innovation should have intended beneficial impact on people other than the individual introducing it, and should challenge the status quo (King, 1992).

Scrutiny of higher education fields reveals a variety of definitions in which benefit to learning and teaching is emphasised, it is “a way of creating new applications of practice to improve and expand student learning and to deal with some of the gnarly and prickly issues that elude educators in achieving that goal” (O'Banion and Weidner, 2010, p. 1). An innovator is one “involved in introducing methods of teaching and learning new to their situation and intended to bring about improvements” (Hannan, 2005, p. 976). The Group of Eight (Australian Universities) defines innovation as “the deliberate introduction of change to add value and improve performance. It draws on the knowledge, skills, understanding, experience, curiosity and imagination of people as they display these within a particular context and apply them through the identification of opportunities and the solving of problems” (Group of Eight (Australian Universities), 2011, p. 5). Thus sound approaches to learning and teaching innovation brings
together all four elements of Boyer’s view of academic scholarship – discovery, integration, application and teaching (Boyer, 1990).

Innovation has been categorised in a variety of ways. It has been described as “individual” (based on ideas of enthusiasts), “guided” (supported by organisational funds and guided by the teaching and learning evidence base), and “directed” (driven by institutions to return investment e.g. in new technology, or for efficiency) (Hannan, 2005). Tomas and Castro developed a model based on analysis of innovation in several universities, and described a hierarchy of innovations; “self-started” (generated from and aimed at the same hierarchical level), “descendent” (designed by superior hierarchical levels and carried out at an inferior hierarchical level) and “ascendant” (proposal of change made at an inferior level and aimed at a higher hierarchical level) (Tomas and Castro, 2011). Others describe grassroots innovation, innovation by persuasion, boundary-leaking change and invisible change (Boyce, 2003).

Innovations have also been viewed as being of two types: “radical” and “incremental” (Gopalakrishnan and Damanpour, 1996) or “revolutionary” and “evolutionary” (Cohn and Turyn, 1984). Incremental innovation represents change that is integrated into existing local context, whereas the radical innovation represents clear departure and has a significant impact on the activities of the wider organisation, including new structures and procedures. Radical innovation, such as the introduction of substantial technological change, is of higher risk (Whitworth, 2012). Defining the boundaries of the concept of innovation is context dependent (Smith, 2011). Wolff also reviewed the literature on innovation and educational change and found no agreed definition or model, but suggested that innovation that is “defined locally by community of practice can effectively transform teaching, learning and the organizations that support these activities” (Wolff, 2008, p. 1185).

Learning and teaching approaches are often presented as self-evident innovation; the innovator rarely defines what this means. In our reappraisal of innovations in healthcare higher education (Phase 4), where innovation was defined, it was in the context of how the learning and teaching approach itself stimulated creativity or innovation. Simulation, for example, is an approach that addresses a broad array of needs in health care including “innovation and exploration to discover potential problems in the health care delivery system or test new methods of work” (Rosen et al., 2012, p. 244). Appreciative inquiry in problem-based learning encourages students “to think positively and creatively about clients and themselves” (Rubin et al., 2011, p. 233). In a review of team-learning and the implementation of innovation, innovation is defined overall as “the implementation of novelties that effect minor as well as major changes in the way nursing teams practice and organise nursing care” (Timmermans et al., 2012, p. 65).

Metaphor is useful in driving thought and creating meaning (Cornelissen, 2005). Smith (2011) takes the innovation metaphor of Kanter (2000) and likens learning and teaching innovation to a flower supported within the garden of contemporary education. Kanter suggests that innovations can “grow wild” like weeds, or they can be “cultivated, blossoming in greater abundance under favourable circumstances” (p. 167).
Concepts of organisational culture

In the previous section we identified that exploring definitions and the nature of innovation may have an impact on a teaching community of practice and the wider organisation and metaphor is an inspiring way of viewing these concepts. Innovation was originally described as a stepwise process, with discrete stages, but is now regarded as non-linear and complex, with emergent properties that are crucially linked to the local environment (Whitworth, 2012; Boyce, 2003; Dooley, 1997). Thus environments from which innovations emerge can be regarded as complex ecosystems. There is a similar perspective on discovery in research: in the Nobel Prize environment innovation is seen as “the ability to break away from established patterns and create something new” (Larsson, 2007, p. 13).

“How is discovery made? It is a complex set of circumstances that leads to original work ... it is a complex ecosystem that we operate in ... there are many factors ... that produce the ultimate success, which include ... good luck, as well as insight ... the right environment ... but that is not enough, you need to find the right colleague ... and there is a lot of hard work until we find the right method.”

James E. Rothman (Nobel Prizewinner in Physiology or Medicine, 2013, in his Nobel Lecture)

The themes of ecosystems and complexity are recurring ones in the innovation literature. Managing innovation is “controlled chaos” (Quinn, 1985). The philosopher Heidegger regarded human nature as being “practically involved in a complex world” and, at least some of the time, being unconventional or authentic, as well as collaborative or cooperative (Steiner, 1995). These ideas align with the Japanese integration model of innovation, with the employment of self-organising teams, learning across many disciplines and levels as a result of functional integration, and adoption of non-sequential, nonlinear development and nonintrusive management. There is “preference for complicating rather than simplifying the innovation process in the interests of richer interpretations” (Steiner, 1995, p. 435). Complexity is significantly positively associated with the adoption of innovations while high levels of centralisation and formalisation in organisations have been shown to reduce the likelihood of adoption of revolutionary innovation in business (Cohn and Turyn, 1984). Change based on chaos or complexity theory is seen as an alternative to the traditional top-down and bottom-up approaches to change in higher education (Evans and Henrichsen, 2008).

Schein described culture as “a set of basic tacit assumptions about how the world is and ought to be that a group of people share and that determines their perceptions, thoughts, feelings, and, to some degree, their overt behaviour”; “it arises through shared experiences of success” (Schein, 1996, p. 11, 12). Business organisational culture is also described as a living phenomenon in which members create shared meaning, group norms and espoused values (Bergson et al., 2008). In this context an organisation that creates an innovative dimension is one that emphasises entrepreneurial orientation, creativity and risk-taking (Bergson et al., 2008).
Competing values models of organisational culture (Denison and Spreitzer, 1991) are relevant in the context of healthcare education, since healthcare practice is “risk averse”.

Organisation culture is also described as “the collection of overt and covert rules, values, and principles that guide organizational behaviour and have been strongly influenced by history, custom and practice” or “the way we do things around here” (Burke and Litwin, 1989, p. 74 cited by Hurley, 1995). Kanter describes a dynamic model of innovation that can be facilitated by leadership and organisation (Kanter, 2000). There are four major “innovation tasks” as (1) idea generation or activation; (2) coalition building; (3) ideal realization; and (4) transfer, or diffusion. These are best supported by “flexibility, breadth or reach, and, particularly, integration”.

Developing and Sustaining Cultures of Innovation

Impact of new technology

There is an increasing demand for the efficient use of new technologies in higher education (Schneckenberg, 2009) and these technological trends are having a huge impact on the drive for innovation (Spanier, 2010; McLoughlin et al., 2008). One third of the papers in the systematic review could be regarded as “technology-driven”, particularly the use of simulation in healthcare higher education, and the need for developing resources for the virtual learning environment.

There are cautions within the wider literature. Technological approaches can lead to “flapping not flying” (Salmon, 2005) and it is argued that technological development should not drive, but be driven by pedagogical and curriculum concerns (Hannan, 2005). It is therefore helpful to view technological innovation explicitly from the perspective of the culture “not through a pedagogical lens, that is, assessing its impact on the teaching and learning process, but instead [focussing] on the diverse objectives of, and negotiations between, the stakeholder groups who sponsored, designed, used and supported the innovation” (Whitworth, 2012, p. 145). Hargadon (2003) referred to by Smith (2006) talks about technology brokering overcoming two obstacles to innovation - it avoids the “competency trap” where groups are locked into tried and tested way of doing things and it helps people see outside the boundaries of the world they inhabit.

Organisations that successfully introduce new technology provide not only infrastructure and internal technical expertise, but also an environment that recognises and rewards teaching (Schneckenberg, 2009; McLoughlin et al., 2008; Bigoness and Perreault, 1981). Most teachers are said to be “risk adverse” when it comes to using technology in teaching (Hagner and Schneebeck, 2001, cited by Renes and Strange, 2011), and are supported best by informal conversations with peers rather than with formal training by technologists (Nicolle and Lou, 2008 cited by Renes and Strange, 2011).

From idea to innovation – a culture of innovation is collaborative and interdisciplinary

There are always creative individuals within an organisation: “organisations are full of ideas” (Smith, 2006, p220). However translating these ideas into innovation success usually requires collaboration, often outside the immediate team. It is said that innovation requires “unconventional individuals . . . to interpret freely, unconstrained by the bounds of their disciplines . . . and by their organizational bounds”. They “need to operate like product champions, cutting through bureaucracy and hierarchy and operating across functions” (Steiner, 1995, p. 434). There is a demand for interdisciplinary knowledge to deal with a changing world and to address complex problems, particularly in healthcare. Interdisciplinarity, the ability to integrate approaches from two or more distinct disciplines, is also seen as an essential requirement in higher education cultures, for innovation and transformative change (Holley, 2009). Organisational environments that support progressive research are notably interdisciplinary, acknowledging that new ideas often arise at “border areas”. They promote the exchange of knowledge and ideas with informal meeting spaces and sometimes intentionally
crowded buildings. One famous example of this was the Basel Institute for Immunology which provided “*academic freedom, tremendous resources, a lack of ingrown bureaucracy, and stimulating cooperation*” (Larsson, 2007, p. 189).

In higher education it has been emphasised that innovation should be seen not as an “*individual trait of charismatic innovators but as a normative requirement of good teaching*” (Elmore, 1996) and that diversity of opinion and range of experience and expertise will produce more innovative approaches to solving challenges and identifying new opportunities (Andrade, 2011). At the Faculty of Veterinary Science, The University of Sydney, institutional change that promoted a stronger relationship between the disciplines led to the “profusion” of ideas and debate, indicating a shift to a more “vibrant scholarly culture” as well as a collaborative approach to curriculum design (Taylor et al., 2007). Academics were trained in shared leadership as a crucial part of the transformational change of that institution. In other contexts curriculum mapping has been shown to increase collaboration in the higher education setting (Uchiyama and Radin, 2009).

Environments that support innovation are “flexible, responsive and allow for coalition formation and connectedness”, with structures “that emphasise diversity, linkages and intersecting territories” and where there is “collective pride and faith in people’s talents, collaborations and teamwork” (Kanter, 2000, p. 169). It is important to have awareness, respect and accommodate discipline differences in approaches to education (Lattuca et al., 2010). This is enhanced by teachers acquiring “interactional expertise” (McFadden et al., 2011). Collaborations, partnership and networks can create communities of practice that overcome challenges when internal incentives and support are lacking – change agents may use these to discuss context issues that emerge (Kezar, 2011).

It is of particular interest that organisations outside of higher education have now intentionally shifted away from the norms of autonomy and independence towards collegiality and collaboration (from “flying solo” to “flying in formation”) (Tierney, 1999b). The literature speaks of the importance of fostering “really real” relationships across the organisation and finding ways of creating a “connective tissue” of cross-functional people and multifunctional partnerships or teams (Zein and Buckler, 1997). “The organizational prescription to encourage cooperation and authenticity is the same as the prescription to foster innovation: create a flat, egalitarian, organizational structure that diminishes unequal power; mandate functional integration to minimize conflict and competition; re-educate or remove prima donnas and autocrats who intimidate individuals; support development of specialist generalists and discourage development of narrow specializations and domains; tolerate error and risk-taking to encourage unconventional and creative interpretations and to discourage safe and obvious ones; and recognize and reward supportive cooperation and caring leadership” (Steiner, 1995, p. 438).

International collaboration is now essential (Spanier, 2010) and most universities have developed strategies to position their institution to be globally competitive and aware. This has an impact on innovation, and was clearly the driver behind a number of innovations in our review of the innovations in healthcare higher education: these related to the development of distance
learning in a web-based environment (Jayawardena et al., 2011) and telesimulation using remote internet access (Mikrogianakis et al., 2011; Eales-Reynolds et al., 2012).

**Developing innovations – a culture of innovation is a culture of learning**

Organisations that are innovative are ones that promote awareness that there are always new and different ways to look at and solve problems (Price, 2007). Most of the innovations in the systematic literature review were not completely new, but introduced new ways of doing things or introduced innovations from elsewhere into a new environment. In many cases the reasons or need for innovation and change were presented in a “needs analysis”, in others the innovation itself was the driver for change e.g. the introduction of new technology.

The key to building an innovative organisation is to nurture the skill of problem solving in everyone (Price, 2007). To put this another way, everyone is “engaged in the dynamic creation and recreation of a culture of innovation” (Zein and Buckler, 1997, p. 276). People and career development efforts are essential to enhance the capacity to understand new ideas, notice novel opportunities and improve problem solving (Hurley, 1995; García-Morales et al., 2011). Environments such as these attract creative talent (Price, 2007). In higher education, innovation is unlikely to be effective unless it is carried out in a professionally reflective manner; in a culture of “reflective assessment” (Tierney, 1999a). In this setting, evaluation becomes part of innovation development, rather than for compliance purposes (Collins good-to-great framework; (Gladwell, 2008 cited by (Andrade, 2011)). Thus an action research approach is important in developing and shaping innovation. Just four of the papers in the review of innovations in healthcare higher education over the last three years summarised their approach as action research (Eales-Reynolds et al., 2012; Lefroy et al., 2011; Crozier et al., 2012; Ross et al., 2012), although many more were evaluated at Level 2b of our Kirkpatrick framework on the basis that there was evidence of active or iterative development within the reporting cycle. Realist approaches to evaluation that encompass: ‘what works for whom, and in which circumstances’ are being used increasingly in a range of settings, including health services (Pawson, 2013) and higher education (Case, 2013).

Organisations that explicitly design appropriate process and procedures to support innovation as part of the wider culture are more likely to see innovation emerge. Innovation is therefore seen as good practice and is openly discussed and debated within structures that promote on-going learning (Elmore, 1996). Successful change, “like successful learning, is a constructive process” (Trowler, 2005, p. 28), with authentic change requiring adaptation to new settings (Kezar, 2011) in which new properties may emerge (Whitworth, 2012; Boyce, 2003; Dooley, 1997). Successful institutional innovation and change is sustained in an environment that practises inquiry and dialogue, utilises action learning and embeds changes in institutional structures, systems and cultures (Boyce, 2003).

Active awareness of changing user needs and user demands and solutions is an important component of innovation activation in companies (Kanter, 2000). Innovative companies have processes such as “having the customer on the team” (Zein and Buckler, 1997). An emerging
theme in higher education is participation of students and service users in curriculum development, as “co-innovators”. Several examples are presented in the section below on Culture of Innovation in Healthcare Higher Education.

Supporting innovations – a culture of innovation is trusting and rewarding

Innovation is not always regarded as synonymous with successful change. Although intended to have benefits, a new approach may fail to actually effect change (King, 1992). Fear of failure is intrinsically demotivating, and therefore an innovative organisation is one that must engender trust (Price, 2007). Cultures of evidence that set out to identify weaknesses in programmes or teaching will worry academics who are concerned about negative repercussions. It can be argued that this process restricts academic freedom (Andrade, 2011). All innovative business companies expect highly experimental work, a large proportion of which is expected to fail, and therefore allocate appropriate resources (Zein and Buckler, 1997). They seek to create a climate associated with a degree of autonomy, tolerance for diversity, and characterised by trust and support between worker and supervisor (Hurley, 1995). Innovative environments embrace risk and encourage all staff to think creatively and unconventionally (O’Banion et al., 2012). A culture in which criteria for success is negotiated would partly overcome these problems (Gunn, 2010).

In the business world it is recognised that supporting innovation requires development of a culture that values innovation by rewarding the individuals involved (Smith, 2006; Hurley, 1995). Innovation-oriented HR systems are training-focused and place an emphasis on team development – both of these support the development of cross-functional teams that are part of a culture of risk taking, worker participation, creativity and shared responsibility (Lau and Ngo, 2004). Staff in higher education are more likely to become involved in innovative practices if they feel they are rewarded or recognised by, for example, funding support or career progression (Smith, 2011). Staff should feel supported, that their work is meaningful and that student learning is at the heart of assessment/evaluation activities, rather than compliance directives (Andrade, 2011). Funding and celebrating action research in learning and teaching supports the development of sound evidence-informed approaches (The Higher Education Academy, 2008; Dexter and Seden, 2012). The criteria for success of an innovation locally negotiated and, in the absence of strong leadership and a culture of critical self-reflection, may simply be used to drive organisational change or reinforce current identity (Marshall, 2010). Nonintrusive management (Steiner, 1995) – broad goals within which innovators can operate freely, build a culture of open communication and shared values, organise the transfer of learning and unlearning throughout the organisation.

There are a number of other tensions in higher education that impact on innovation. Academics perceive that “academic prestige … is incompatible with “innovation”” and may “play games” to ensure their project is valued and recognised (Smith, 2011, p. 436). Managerial approaches have led to a shift from the focus on the individual to centrally guided and managed institutional innovation. In these circumstances innovation becomes centrally accountable and the values and discourses may be discordant with traditional academic ones (Findlow, 2008). Parity between research and teaching is another tension with an impact on innovation in learning and teaching.
Innovation is obstructed by low esteem of teaching and learning, compared with research. Innovation in teaching and learning is most likely to take place when the institution has a policy establishing parity between research and teaching and learning, including for purposes of promotion, and the policy was reflected in practice (Hannan, 2005). Workload concerns by academics are also barriers to involvement in evaluation and development work (Cummings et al., 2008). Staff need time to try new things, there needs to be “space for wild things to grow” otherwise creativity is stifled and personal growth limited (Smith, 2011).

Leadership and organisation – removing the barriers to innovation

Lack of innovation is not usually due to a lack of ideas: the process of innovation depends on the environment. Academic practice has boundaries (departments, programmes etc.), that bring issues of power and control, which may be barriers to collaboration (Holley, 2009; Becher and Trowler, 2001). However universities can intentionally erode discipline boundaries by creating units that require integration and application (Taylor et al., 2007) and constructing buildings that encourage interaction (Holley, 2009). Max Perutz speaks of how he strove to design a creative environment at Cavendish laboratory in Cambridge “to stimulate the exchange of ideas, we built a canteen where people can chat at morning coffee, lunch and tea”. However he also emphasised that “discoveries cannot be planned and can be stifled by hierarchical organization, inflexible bureaucratic rules” (Larsson, 2007, p. 208, 209).

In business it is recognised that “different sorts of people playing different roles could make a difference to innovation” (Steiner, 1995). Product champions, using power and prestige, may overcome organisational resistance to innovation (Schön, 1963). Having a champion at the senior level is also perceived as important by innovators in higher education settings (Smith, 2011). The Innovations in Teaching and Learning in Higher Education project, funded by the Economic and Social Research Council, found that innovation was most likely to take place when the innovator was supported by someone in authority and when colleagues and people in authority showed interest in disseminating the outcomes (Hannan, 2005). Conversely innovation was obstructed by lack of recognition or interest by colleagues and people in authority.

Leadership strategy is identified as important in managing change and innovation effectively (Kezar and Eckel, 2002): ‘change resides at the heart of leadership’ (Latta, 2009, p. 35). Leaders who place an emphasis on self-direction, allowing individuals freedom to make their own choices, to create, explore and learn are likely to lead innovative organisations (Bergson et al., 2008). Participative decision making and power sharing are described as important (Hurley, 1995). In contrast to transactional leadership, transformational leadership that “heightens the consciousness of collective interest among the organization’s members and helps them to achieve their collective goals … creating emotional links and inspiring higher values … becomes the motor and transmitter of innovative culture” (Garcia-Morales et al., 2011, p. 1040). In this environment ideas are not “rolled out” but are “co-created” by all members of the organisation, although the leader may set challenging targets (Zein and Buckler, 1997). In addition to commitment to excellence, valuing autonomy of teaching and a strong sense of community,
shared governance or a collaborative approach to decision making are also identified as key to successful change in higher education (Merton et al., 2009).

Highly innovative organisations treasure their identity and have an abundance of stories (Zein and Buckler, 1997). Mission statements “can elicit emotional commitment that links individual members to broader organizational purposes” (Fugazzotto, 2009). Vision and mission statements that indicate commitment to innovative practice may not lead directly to innovation, but it may create the institutional “space” required for innovation to emerge and develop (Dubrowski et al., 2007; Gunn, 2010; Whitworth, 2012). There were a number of examples of organisational strategies that were innovation-focused within healthcare higher education literature: for example the University of Leicester has a Learning Innovation Strategy (Nie et al., 2011) and the University of Ottawa has an Academy for Innovation in Medical Education (Cook et al., 2013).

Shared leadership models may include co-creation of the vision for the institution (Andrade, 2011). The sense of community should be created across the whole organisation; “crafting a culture of innovation is a “story of connections” across the organisation to external partners, and to the vision of the organisation” (Zein and Buckler, 1997, p. 287).

**Disseminating innovation – the wider impact of a culture of innovation**

According to Rogers’ innovation diffusion theory, successful diffusion results from the perceived attributes of the innovation, the adopter category (innovator, early adopter, early majority adopter, late majority adopter and laggards or non-adopters), change agents and the consequences of the innovation, as well as institutional characteristics (Rogers, 2003). The “scale-up” or “roll-out” approaches to disseminating innovation, in which innovations are selected, tested, evidence of efficacy is disseminated, and adoption by others is based on the evidence base of its value, rely largely on this model. However innovations are shaped at the local level and this should continue within organisational and social spaces encountered during development and dissemination (Whitworth, 2012). Since innovation is not independent of the context it has been suggested that the “diffusion” approach to dissemination is flawed (Kezar, 2011) and that change in higher education systems requires an approach that is slower and sustained (Coburn, 2003). Deep changes in the assumptions and beliefs about learning and teaching are required and multidimensional and therefore complex models might better describe spread of innovation in higher education contexts (Clegg et al., 2008). The process of change which is flexible and negotiated between educational developers and teachers has been described as “mutual adaptation” (Datnow et al., 1998).

Universities can be seen as “loosely coupled” systems with relatively autonomous departments (Weick, 1976; Boyce, 2003). Such structures foster generation of local innovation and may allow innovation to coalesce from multiple practices simultaneously (Marion, 1999). “Distributed” structures however may be a barrier to large-scale innovation and a particular challenge in eLearning innovation (Schneckenberg, 2009). An innovation is likely to be successfully disseminated if it is perceived to align to an institution’s strategic objectives (Smith, 2011). This
can also be a barrier to true innovation as lecturers play a game of strategy rather than engaging in sustainable bottom-up approaches (Findlow, 2008).

Innovation dissemination, in contrast to the intensive process of innovation development, is an extensive process (Kanter, 2000). Thus, paradoxically, the spread of incremental or evolutionary innovation may be more successful in environments that are characterised by formalisation and centralisation (Cohn and Turyn, 1984).

In business the open source strategy, a process that connects innovators with companies that are innovative, is used. In higher education there are similar processes that connect academics from different disciplines, or academics with students or with external stakeholders, and academics support services, including those with expertise in academic development. The contribution of organisations such as the Higher Education Academy, the Society for Research into Higher Education and Joint Information Systems Committee (Jisc) may be more important to the innovation process than allocating more internal resources in universities.
Cultures of Innovation in Healthcare Higher Education

During the review of the literature around cultures of innovation in higher education and beyond, the innovations gathered in the first literature review were scrutinized again in the light of themes that had emerged. Although few papers reported an action research approach to innovation development, approximately a third of the papers reached level 2b on the Kirkpatrick culture of innovation scale, indicating that there was evidence within the report that innovation had led to a change in local practice and that the innovation had been adapted and contextualised.

Presage-Process-Product framework for cultures of innovation

The 3P framework was used and developed throughout the review process. In a later section we reflect on its value in this context and relate it to the adapted Kirkpatrick evaluation tool. Here we will briefly describe the final model (Appendix II) and use it to underpin the subsequent discussion.

In our 3-P model of the culture of innovation, the teaching and learning innovation is the Product (the star) that is developed within an environment that evaluates the impact on student learning and is continually refreshing itself in an enhancement-led manner (the Process). These are within a wider context (the Presage) that supports innovation generation, development and dissemination inside and outside the institution. Within and beyond the institution innovations will need to be adapted and developed to suit the local context.
In the literature review the importance of “connections” emerged as a strong theme. There is no evidence that healthcare higher education is different to other areas of higher education in fitting this model. Connections have an important role at all levels - Presage, Process and Product. Innovation generation is more likely to occur when individuals are not constrained by discipline boundaries and innovation development is most effective in collaborative and interdisciplinary environments. Examples of the role of students and service-users as collaborators in innovation development are given in following sections. In healthcare higher education innovations in learning and teaching often contain interdisciplinary and interprofessional elements. Examples of these are also contained in the following sections. Connections create a dynamic environment necessary for learning across the organisation and for dissemination of innovation.

**Drivers and barriers to innovation activation**

New technology seemed to be the driver for at least a third of the innovations in the first literature review.

**How do e-book readers enhance learning opportunities for distance work-based learners?**
(Nie et al., 2011)

This paper reports the incorporation of e-book readers into delivery of two work-based distance-taught master’s programmes. The University plans to use this approach to overcome the challenges faced by learners on distance learning programmes. As part of a wider project funded by Jisc, two modules in different discipline areas were targeted with the intention, if successful, to widen the application across the organisations. There is a discussion of the opportunities and limitations to integrating e-book readers into curricula. Enhanced flexibility in curriculum delivery and improved efficiency in use of study time are highlighted as key benefits.

Although most of the innovations were not technology driven, blended approaches were often used to meet local needs (Davidson, 2011; Davidson et al., 2011; Riesen et al., 2012; Rigby et al., 2012; Thomson et al., 2011). The importance of strong IT literacy and support (Maloney et al., 2013b) was emphasised. A systematic review of in situ simulation concluded that, in contrast to the amount of attention in situ simulation has received, there has been little rigorous research, which is crucially needed to identify when it can be used to greatest effect and how to blend it with other learning activities (Rosen et al., 2012). A deep approach to evaluation with awareness of the context of the innovation is highlighted.

Although, anecdotally, meeting requirements of professional bodies for accreditation is stated as being a barrier to change by educators, the literature presented no evidence to support this perception.
Students and service-users as co-innovators and teachers

In a few papers, students were clearly co-creators of the curriculum (Savage et al., 2011; Hale et al., 2011; Kelly and Fry, 2013; Fell, 2010; Sims-Giddens et al., 2010).

**Turning the tables: When the student teaches the professional — A case description of an innovative teaching approach as told by the students**

(Savage et al., 2011)

This paper describes an innovative course, the idea for which emerged in a practice education setting. Created to align to the competencies of an already established course based on critical case methodology and skills training, the innovative option was introduced concurrently. The students became teachers, designing and delivering continuing nursing education courses (20-minute web-based modules; quality assured by medical and nurse experts). Although not compulsory, all students agreed to act as researchers as well as research subjects, to evaluate the approach. Their names were included in the list of authors on the paper.

**Masters Nursing Students’ Perceptions of an Innovative Simulation Education Experience**

(Kelly and Fry, 2013)

Simulation was introduced into a master of nursing course. Students developed authentic scenarios from lived experienced that were enacted. The programme resulted in a new awareness of the extent and range of simulation activities.

Several other papers described the role of students as peer teachers (Hale et al., 2011; Shiyanbola et al., 2012; Fogstad and Christiansen, 2011; Warner et al., 2010).

A number of papers highlighted the importance of service users in curriculum design – development of simulation-based learning in geriatrics (Lange et al., 2011), patient-centred care in physical therapy (Rapport et al., 2010), HIV training in dentistry (Rogers et al., 2011) ovarian cancer by cancer survivors (Fitch et al., 2011). Input by service users into refinement of a competency-based assessment (Ross et al., 2012). Academic with lived mental health experience teaching recovery-focused care (Byrne et al., 2013).

**Survivors teaching students: Increasing awareness about ovarian cancer**

(Fitch et al., 2011)

This is an innovative programme developed by Ovarian Cancer Canada in response to new evidence related to the symptoms of ovarian cancer. The programme has been adapted to become an integral part of nursing and medical courses across multiple higher education institutions in the US and Canada. The recruitment and training of the survivor volunteers was identified as a key aspect of the programme and was regarded as providing a unique and valuable perspective to the student learning experience. Challenges that were identified included how to align the patient stories with the subject knowledge required by students, ‘finding time’ in the undergraduate curriculum, and the cultural shift of seeing service-user and carer voices as valued and integral to healthcare programmes.

There were several other innovative approaches to community involvement in healthcare higher education (Pham et al., 2010; Lange et al., 2011; Rapport et al., 2010).
Introducing clinical paediatrics to medical students: a novel hospital visitation programme involving kindergarten children
(Pham et al., 2010)
In order to introduce medical students to clinical paediatric medicine a programme involving well Kindergarten children visiting Sydney Children's Hospital was developed. This innovation stemmed from the need to meet increased demands for clinical teaching (due to the increase in number of medical schools and hence student numbers) coupled with reduced availability of suitable patients (due to reduction in length of stay).

Interdisciplinary and interprofessional approaches

Interdisciplinary and interprofessional approaches are strongly represented in the literature. McFadden and co-workers integrated the concept of interactional expertise in developing an interdisciplinary postgraduate certificate programme (McFadden et al., 2011). The programme design appeared to succeed in “breaking down the “silo” mentality of departments” and in promoting engagement in “systems thinking” by healthcare professionals. In the papers identified in the original review, several described novel approaches to interprofessional learning, using cross-professional peer teaching (Hale et al., 2011; Shiyanbola et al., 2012; Fogstad and Christiansen, 2011; Warner et al., 2010) simulation environments (Riesen et al., 2012; Kelly and Fry, 2013; Bowden et al., 2012) and in the design of e-learning resources (Gordon et al., 2010; Ellman et al., 2012; Solomon et al., 2010; Halabisky et al., 2010; Lange et al., 2011; Zollner et al., 2013; Callaghan et al., 2011).

A university clinic: an innovative model for improving clinical practice
(Warner et al., 2010)
A model for improving interdisciplinary collaboration is presented. A community cardiovascular risk assessment clinic was created within the University. In the context of working in this setting, undergraduate nursing and podiatry students learned, from each other, skills outside their professional practice and undertook assessment that was relevant to their own profession and curriculum requirements.

Supporting reflective practice

Reflective practice and promoting empathy were the focus of many innovations identified in the first review. Several reports focus on learning empathy (Lefroy et al., 2011; Lim et al., 2011; Mueller et al., 2010; Reilly et al., 2012; Shield et al., 2011; Webster, 2010). Medical students using behaviour change plans as a learning activity that was effective in raising awareness and providing insight into the impact of asking patients to make lifestyle changes (Kushner et al., 2011). Another reported a novel approach to address attitudes to obesity by developing longitudinal relationships between medical students and bariatric surgery patients (Roberts et al., 2011). Other aspects of reflective practice are the focus of innovative approaches – increasing reflection through writing (Aronson et al., 2011; Attar et al., 2011; Hudson et al., 2012), frequent sampling using mobile technology (Lachmann et al., 2012), videos of practice and guided reflection (Bowden et al., 2012; Maloney et al., 2011; Maloney et al., 2013a; Maloney et al., 2013b), artistic representation (Aauty and Walker, 2011; Leipert and Anderson, 2012; Lillyman et
al., 2011), experiential learning (Roberts et al., 2011; Rees, 2013) with a spiritual dimension (Baldacchino, 2010; Ellman et al., 2012) and the use of 360-degree feedback (Hayward and Blackmer, 2010).

Artistic Representation: Promoting Student Creativity and Self-Reflection
(Auty and Walker, 2011)
In an introductory counselling course, students are asked to create a three-dimensional piece of art “that expressed and reflected their ideas about a) the field of counseling in general, b) some specific topic in the field of counseling, or c) something they hoped to learn”. The experience in personal creativity and self-reflection of the course facilitators was seen as a key enabler. Themes that emerged included the realisation by students of what reflection means, the emotional response to reflecting on the artistic experience and the perception by students that the artistic representation project had real impact on their personal development.

There were a few reports of novel approaches to feedback (van Hell et al., 2011; Bowden et al., 2012; Hettema et al., 2012) and assessment (Balayla et al., 2012; Bloomfield et al., 2010; Dory et al., 2010; Harrison et al., 2012; Hayward and Blackmer, 2010; Hudson et al., 2012).

Arts-based approaches to healthcare higher education

Several papers used an arts-based approach to facilitating learning, including fostering creativity and innovation in students. There is interest in this innovative approach to teaching and learning which has the “potential to engage learners, foster understanding of multiple perspectives, and simultaneously connect cognitive and affective domains of learning” (Rieger and Chernomas, 2013).

Music auditory training has been used successfully to improve auscultation skills (Pellico et al., 2012). Artistic representation (Auty and Walker, 2011), storyboarding (Lillyman et al., 2011) and photovoice (Leipert and Anderson, 2012) have been used to promote creativity and self-reflection. Use of theatre is reported (Reilly et al., 2012; Koponen et al., 2011; Lim et al., 2011; Meng and Sullivan, 2011) and using professional actors in patient roles (Sutin et al., 2011; Zavertnik et al., 2010).

LOOKING is not SEEING and LISTENING is not HEARING: effect of an intervention to enhance auditory skills of graduate-entry nursing students (Pellico et al., 2012)
This paper presents the outcomes of an intervention that was intended to enhance the auscultation skills of advanced nursing students, by training them in music discrimination. The music was designed to mimic body sounds and students were coached through a series of tasks of increasing complexity. A two-hour session doubled the ability of students to correctly identify a heart murmur. Future plans for the programme are described on the Yale School of Nursing website. An alternative design is planned as well as creation of a tool box to support national dissemination.
Rural nursing education: a photovoice perspective
(Leipert and Anderson, 2012)
This study explored the use of the photovoice method to foster learning about and interest in rural locations and rural nursing. Third and fourth year nursing and health sciences students took photographs that represented challenges and facilitators of rural nursing practice and then engaged in written reflection about their photos.

Arts-based approaches are all potentially high-impact learning experiences (Kuh, 2008). These approaches are also used as methods in health research (Boydell et al., 2012; Fraser and al Sayah, 2011). Students generally feel that arts-based learning makes a valuable contribution to curriculum with a potential to impact on developing a broader awareness of self-identity, awareness of others and communication skills (de la Croix et al., 2011). Further study is required to more fully understand the effectiveness of this approach within a healthcare higher education setting (Perry et al., 2011).

Innovation in the healthcare service sector

In parallel with trends in higher education, and relevant to this review, are discussions within the healthcare service sector around creating cultures in which innovations can thrive (Everett and Sitterding, 2013). Since a significant component of nursing, midwifery and allied healthcare practitioner learning takes place in practice, the service environment is an early influence. Researchers have used the health service setting to study the process of innovation and development frameworks that increase the likelihood of success (King, 1992; Fernández, 2001). It appears that incremental innovations follow more linear patterns of development, while radical ones are far more complex as they are constructed socially by different people making different contributions at different times, as they are integrated into existing activities and organisational frameworks (Fernández, 2001). Research into this complex process has highlighted variables related to “the innovation itself, the local implementation context, and the behavioural strategies used to implement the innovation” (Chaudoir et al., 2013). A lack of a unified theory and frameworks to guide implementation research is highlighted.
Reflections and Limitations

Although many reports of innovations in the healthcare higher education literature do not adequately describe the context, it is possible to catch glimpses of the surrounding culture. Theoretical frameworks and discussions with colleagues were helpful in exploring concepts and developing the literature review and conclusions.

The value of the Kirkpatrick hierarchy for evaluating cultures of innovation

The Kirkpatrick hierarchy (Kirkpatrick, 1967) is regarded as a useful model in the evaluation of healthcare education. It aligns well with the intention of health professional education programmes to produce graduates who will be effective in the workplace and have an impact on the quality of patient care and the development of innovative healthcare practices. This model is often adapted for use in best evidence systematic reviews of educational outcomes (Hammick et al., 2010). We adapted it for the purpose of evaluating the culture of innovation, however there was low concordance amongst reviewers, and it seems that it is initially difficult for educators in healthcare higher education not to use it as a teaching rather than a cultural evaluation tool. There may also have been a tendency to overrate those innovations that were particularly novel, even when the impact was low. However we believe that the modified Kirkpatrick framework facilitated a shift in perspective in the reviewers, allowing us to see past the innovation itself, and we will continue to incorporate it into discussions around innovation cultures.

Reflections on the 3-P model as a conceptual framework

The 3P model is appealing because it describes a complex system in which each component influences the others. Even an innovation that appears to be isolated during its development phase “must be connected with the actors and activities that will allow it to be actually used” (Kanter, 2000, p. 119). This framework has been used in a systematic review of Interprofessional Education (Hammick et al., 2007) and in describing cultural change in a higher education setting (The University of Sydney) (Taylor et al., 2007). We used the 3-P model as a conceptual framework; also using it to develop specific questions for the Kirkpatrick culture of innovation hierarchy (Appendix III). The following illustration demonstrates our view of a culture of innovation as a complex system, with presage factors that overlap and interact and within which process factors support the development of ideas to innovation.
To further test our framework and extend our discussions to a wider community. We interviewed, independently, the Principal and Vice Chancellor, the Depute Principal and the Vice Principal for Learning and Teaching of our own university, which is in the process of extensive organisational change. The responses to the questions “what is innovation” and “how can a university create a culture of innovation” aligned well with our conceptual model. The process of innovation development was central: “Innovation is doing something differently, in a way that is more effective”; “Innovation is looking to other contexts to evolve ways to solve problems” and “it is important to challenge one’s own practice … and recognize the need for critically reflective practice. The idea that the process of innovation involves risk-taking was also evident: “Innovators need to be brave, confident and edgy in their thinking”; “Some of the innovations won’t be successful – and that’s OK. A degree of risk-taking is expected and innovations should be allowed to fail. Trust is an also an important characteristic in an organisation that supports innovation”.

The organisational context has a major impact: it should develop “a shared vision of what we want to achieve” and staff should be fully supported: “It is important that people are empowered to try out their ideas/do things differently and that there are no barriers. Removing those barriers is my role” and “The innovative organisation nurtures and supports the development of skills and competences required for innovation to emerge”. Students were considered central to the process: “Students should, from day one, know that they are part of a partnership in learning and research, and the development of both. They should never feel excluded from the process”. External influences were acknowledge as facilitators “external bodies, such as the Higher
Education Academy can be helpful in supporting innovation by stimulating discussion that challenges and changes mindsets. Consideration was given to whether there are differences in healthcare compared to other areas of higher education: “A key to understanding what sets healthcare apart from other areas of higher education is the closeness of the connection between the academic environment that includes research, and the impact on patient care. This leads to an emotional and intellectual buy-in that is enormously important”.

Limitations

Almost all of the literature around developing and sustaining cultures of innovation is from outside healthcare higher education. This wider literature review started as a scoping exercise incorporating both systematic and informal elements. As educators in healthcare education supported by discussions with academics leaders in higher education, we are confident that we have identified relevant major themes.

We used papers from the first systematic review (Deamley et al., 2013) as the main source of examples of innovations in healthcare. This was limited to three years and we may have overlooked important earlier examples. The papers were distributed to 12 educators for assessment according to the modified Kirkpatrick hierarchy, and there was discordance in the assessment. This may have related to different perceptions of the Kirkpatrick hierarchy. To resolve this issue it would be necessary to undertake another cycle of workshops in the use of the modified Kirkpatrick hierarchy and reassess the papers. We have therefore not identified the Kirkpatrick level for each paper in this review.

Conversations and discussion with individuals within one institution do not represent generalisable evidence, however these were valuable opportunities to test the models and were the sources of ideas and further literature.
Conclusions and Recommendations

Reports in healthcare higher education often describe work as innovative but it is not clear how the word innovation is defined. The review of the wider higher education literature would suggest that the definition of innovation used to inform *Innovation in Learning and Teaching in Health Higher Education*, “doing something new in teaching and learning” and “a new, sustainable approach that has led to an overall improvement in the student experience, and which is supported by evidence”, is supported. Discussion about meanings and concepts behind the terms innovation and culture are likely to stimulate development around cultures of innovation. The use and development of theoretical models such as the 3-P and Kirkpatrick frameworks can facilitate this process and is recommended.

An environment that is most likely to foster innovation in healthcare higher education is one that encourages interdisciplinary and collaborative approaches, is enhancement-led and critically reflective, encourages new ideas and their development, and rewards staff for new approaches. Transformational leadership is a key to creating such an environment, along with shared organizational vision that encompasses distinctive impact across and beyond the organisation.

Arts-based approaches to learning and research into learning and teaching may be useful to foster creativity and innovation in students and staff and should be further explored.

Creative individuals are usually able to work at the boundaries between disciplines. Innovation development requires identifying connections, and creating and building curriculum design teams that include students and other stakeholders. Innovation is context dependent and realist evaluation approaches are recommended in evaluating the impact on student learning. This should also be considered as part of the dissemination strategy. Reports should include information about context, including enablers and barriers. This would support development of a robust evidence base on which to develop and sustain cultures of innovation in healthcare higher education.
References


# Appendix I Kirkpatrick Hierarchy for Cultures of Innovation

<table>
<thead>
<tr>
<th>Level</th>
<th>Reaction</th>
<th>Learning – change in attitudes</th>
<th>Learning – modification of knowledge or skills</th>
<th>Behaviour – change in behaviour</th>
<th>Results – change in organisational practice</th>
<th>Results – wider change – in healthcare practice, in higher education practice</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level 1</td>
<td>Reaction</td>
<td>Views on the innovation, views the culture in which it was developed; from learners, teachers, and the organisation</td>
<td>Change in attitudes or perceptions to teaching and learning, to change, to innovation</td>
<td>Acquisition of concepts and principles; skills of creativity, measured risk-taking, needs assessment</td>
<td>Transfer of learning to innovative approaches by others within, and outside, the organisation</td>
<td>Wider changes in the organisation, attributable to a subculture of innovation</td>
</tr>
</tbody>
</table>
Appendix II Presage-Process-Product (3-P) Model

**Presage**
- Organisation
  - Values, Mission, Strategy
  - Leadership, Vision
  - Perceptions of learners and teachers
  - Funding, Reward and recognition
  - Management, administrative and ICT support

**Teacher characteristics**
- Conceptions of innovation
- Perceptions of the organisation
- Perceptions of requirements of professional bodies
- Perceptions of learners and learning
- Expertise, Reflective practice
- Enthusiasm, Leadership

**Learner characteristics**
- Conceptions of innovation
- Perceptions of organisation
- Perceptions of teachers
- Expectations, Enthusiasm

**Process**
- Approaches to innovation (developing a community of innovative practice)
  - Collaboration, sharing
  - Teaching teams and teaching development
  - Student voice
  - Opportunities to test ideas
  - Iterative development of new initiatives
  - Evaluation
  - Peer support and peer review
  - Cross-disciplinary activities
  - Scholarship, Transparency

**Product**
- Innovations
  - Dissemination
  - Impact on student and staff experience
  - Impact on teaching and learning in the discipline
  - Impact on teaching and learning in higher education
  - Impact on healthcare practice and outcomes
Appendix III Kirkpatrick Hierarchy for Cultures of Innovation – Incorporating Presage-Process-Product Factors

Suggestions for questions relating to Presage, Process and Product to assist in evaluating a *culture of innovation* using the modified Kirkpatrick Hierarchy.

**Level 1 Reaction**
(views on the innovation, views of the culture in which it was developed, from learners, teachers, and the organisation)

**Presage**
What do learners and/or teachers think about the environment in which the innovation sits?
What are the values, mission and strategies of the organisation?

**Process**
To what extent are students regarded as partners in the design, including evaluation, of the innovation?
To what extent do individual teachers collaborate with other teachers, or learning developers, in the design, including evaluation, of the innovation?

**Product**
What do learners and/or teachers think about the efficacy of the innovation?

**Level 2a Learning – change in attitudes**
(changes in attitudes or perceptions to teaching and learning, to change, to innovation – this is a prerequisite for innovation and creativity to emerge in local community of practice)

**Presage**
As a result of the innovation, or the creative process, have learners and/or teachers changed their attitudes to, or perceptions of, learning and teaching?
As a result of the innovation, or the creative process, has there been a change in attitudes to, or perceptions of, innovation or creativity?

**Process**
Do students and/or teachers reflect on the process of designing, evaluating and developing the innovation?
Do members of the team reflect together on the process of designing, evaluating and developing the innovation?

**Product**
Have any changes in attitude (by learners or teachers, individually or as part of a team), that have arisen as a result of the innovation been used to propose further development of the innovation?

**Level 2b Learning – modification of knowledge or skills**
(acquisition of concepts and principles; skills of creativity, measured risk-taking, needs assessment – this is necessary in order to foster innovation and creativity in local communities of practice)

**Presage**
Have learners or teachers changed their expectations of teaching and learning as a result of the innovation?

**Process**
To what extent have students been active partners in the design, including evaluation, of the innovation (thus likely to have acquired the concepts and principles, and skills that are relevant to creativity)?
To what extent has the collaborative team developed its expertise?
Product
Have any changes in knowledge and skills acquired by learners or teachers, individually or as part of a team, as a result of the innovation been used to further develop the innovation within the reporting cycle?

Level 3 Behaviour – change in behaviour
(transfer of learning to innovative approaches by others within, and outside, the organisation - fostering innovation and creativity in other communities of practice)

Presage
As a result of the innovation, or the creative process, have there been changes in attitudes to, or perceptions of learning and teaching, or innovation or creativity, by other individuals within or outside the organisation (learners or teachers)

Process
Has the innovation led to a change in practice by individuals or groups in other parts of the organisation?
Has the innovation led to a change in practice by individuals or groups in other organisations?

Product
Has the innovation been further developed after adoption within or outside the organisation?

Level 4a Results – change in organisational practice
(wider changes in the organisation, attributable to a subculture of innovation - contributing to the culture of innovation at the institutional level)

Presage
Have the values, mission and strategic plans of the organisation changed as a result of the innovation?

Process
Has the innovation contributed to the base of expertise available across the organisation?

Product
Has the innovation led to a change in practice that is in itself reflective/evaluative, across the organisation?

Level 4b Results – wider change – in healthcare practice, in higher education practice
(improvement in patient care, health provision, teaching and learning in higher education generally - contributing to the culture of innovation across the health care or learning and teaching sectors)

Presage
Have ideas about patient care, health provision, or theories of teaching and learning in higher education generally changed as a result of the innovation?

Process
Has the innovation contributed to the base of expertise available to contribute to development across the sector?

Product
Has the innovation led to a change in practice that is in itself reflective generally in patient care, health provision or teaching and learning in higher education?