

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?

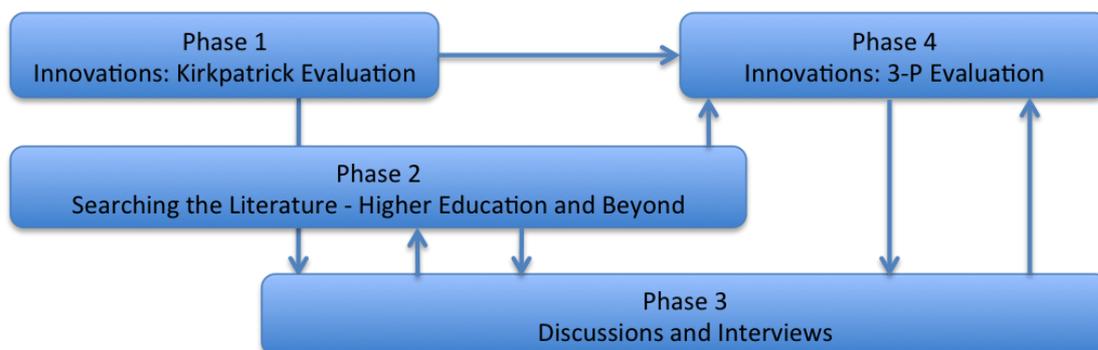
The aim was to review the recent literature on cultures of innovation and summarise how they are developed, sustained and extended, including associated barriers and enablers, in a way that is relevant to healthcare higher education and can be used to inform future practice.

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?

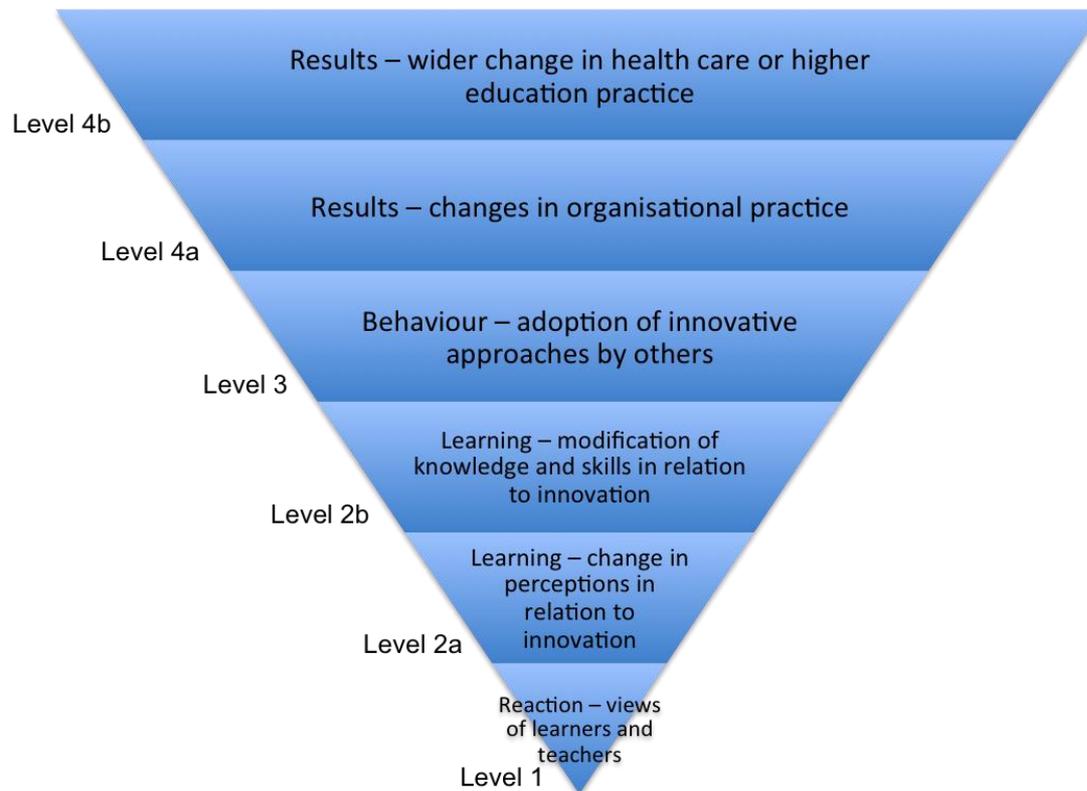
Methodology

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	Journal of Educational Evaluation for Health Professionals
Advances in Health Sciences Education	Journal of Nursing Education
Health & Social Care Education	Journal of Nursing Education and Practice
International Journal of Nursing Education Scholarship	Medical Education
International Journal of Practice-based Learning in Health & Social Care	Medical Education Online
Journal of Continuing Education in Nursing	Medical Teacher
Journal of Continuing Education in the Health Professions	Nurse Education in Practice
Innovative Higher Education	Nursing 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 (Dearnley 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 Chernomas, 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

Second reviewer (n=1)	4b						
	4a						
	3	2		2	3	1	
	2b	4	3	14	2	5	1
	2a	6	7	21	6		
	1	18	3	14	2	2	2
		1	2a	2b	3	4a	4b
First reviewer (n=12)							

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*” (García-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-focussed 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).

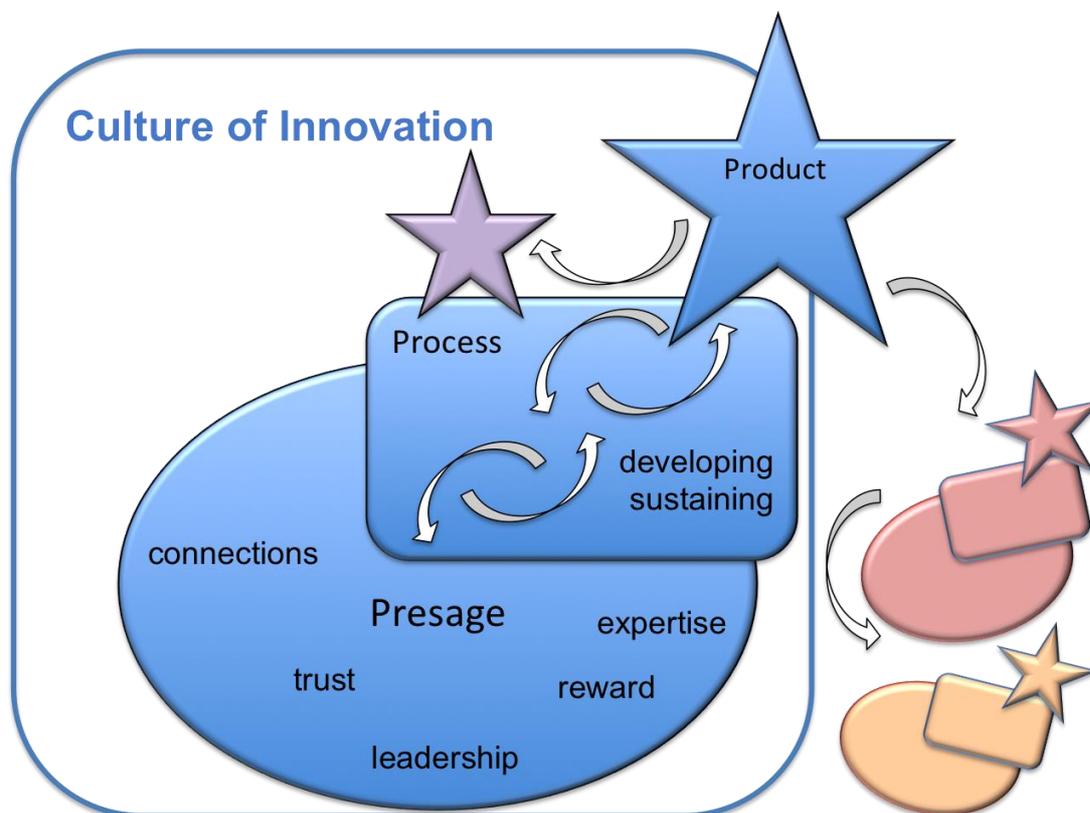
In business the open source strategy, a process that connects innovators with companies that are innovative, is used. In higher education there are similar processes that connect academics from different disciplines, or academics with students or with external stakeholders, and academics support services, 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 experiences 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; Shiyabola 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 (Autry 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

(Autry 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 (Autry 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; Zavertrnik 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

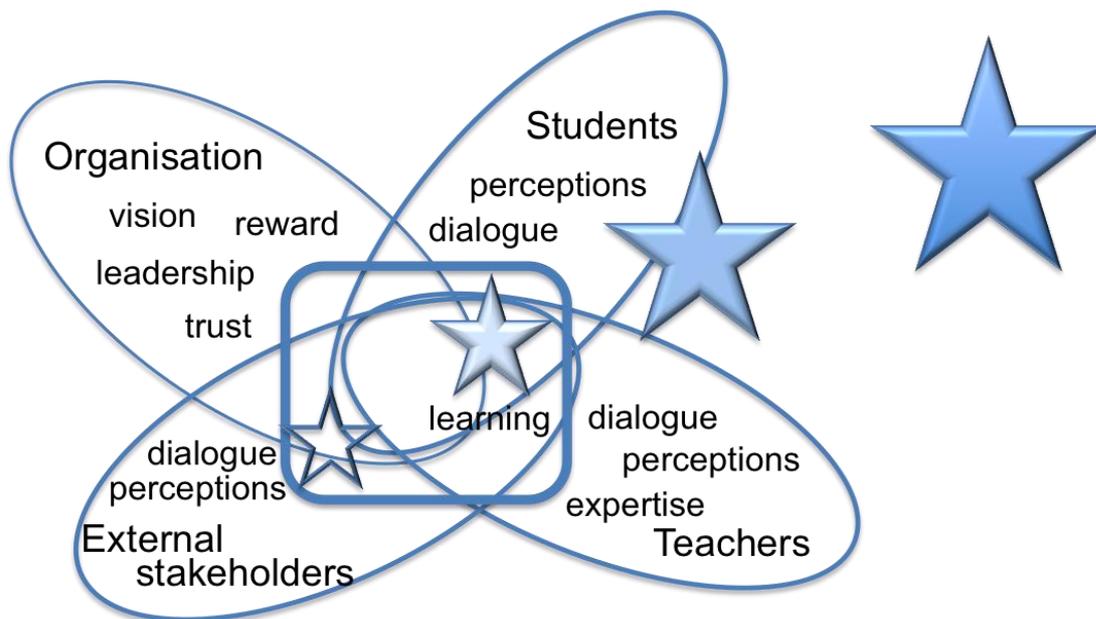
Although many reports of innovations in the healthcare higher education literature do not adequately describe the context, it is possible to catch glimpses of the surrounding culture. Theoretical frameworks and discussions with colleagues were helpful in exploring concepts and developing the literature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



3-P Model of a Culture of Innovation: Characteristics of the organisation, students, teachers and external stakeholders are overlapping and interacting (Presage – represented by the ellipses). Within this system creative ideas (open star) are developed (Process – represented by the rectangle) to innovations (Product – represented by the blue stars), which are sustained and may be disseminated.

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 (Dearnley 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

- Abu-Rish E, Kim S, Choe L, et al. (2012) Current trends in interprofessional education of health sciences students: A literature review. *Journal of Interprofessional Care* 26: 444-451.
- Anderson LS and Enge KJ. (2012) Education and Information for Practicing School Nurses: Which Technology-Supported Resources Meet Their Needs? *Journal of School Nursing (Sage Publications Inc.)* 28: 358-369.
- Andrade MS. (2011) Managing change-engaging faculty in assessment opportunities. *Innovative Higher Education* 36: 217-233.
- Aronson L, Niehaus B, Lindow J, et al. (2011) Development and pilot testing of a reflective learning guide for medical education. *Medical Teacher* 33: e515-521.
- Attar A, Bazrafkan L, Naghshzan A, et al. (2011) A Survey on Medical Students' Viewpoint on Logbook as a Tool for Recording New Ideas and Reflection. *Iranian Journal of Medical Education* 11: 1-8.
- Autry LL and Walker ME. (2011) Artistic Representation: Promoting Student Creativity and Self-Reflection. *Journal of Creativity in Mental Health* 6: 42-55.
- Balayla J, Bergman S, Ghitulescu G, et al. (2012) Knowing the operative game plan: a novel tool for the assessment of surgical procedural knowledge. *Canadian Journal of Surgery* 55: S158-162.
- Baldacchino D. (2010) Caring in Lourdes: an innovation in students' clinical placement. *British Journal of Nursing* 19: 358-366.
- Becher T and Trowler PR. (2001) *Academic Tribes and Territories 2nd Ed*: The Society for Research into Higher Education and Open University Press.
- Bergson Y, Oreg S and Dvir T. (2008) CEO values, organizational culture and firm outcomes. *Journal of Organizational Behavior* 29: 615-633.
- Biggs J. (2003) Teaching for quality learning at university: What the student does. *The Society for Research into Higher Education & Open University Press* 2nd Ed.: pp11-33.
- Bigoness WJ and Perreault WD. (1981) A conceptual paradigm and approach for the study of innovators. *Academy of Management Journal* 24: 68-82.
- Bloomfield J, Fordham-Clarke C, Pegram A, et al. (2010) The development and evaluation of a computer-based resource to assist pre-registration nursing students with their preparation for Objective Structured Clinical Examinations (OSCEs). *Nurse Education Today* 30: 113-117.
- Bowden T, Rowlands A, Buckwell M, et al. (2012) Web-based video and feedback in the teaching of cardiopulmonary resuscitation. *Nurse Education Today* 32: 443-447.
- Boyce ME. (2003) Organizational learning is essential to achieving and sustaining change in higher education. *Innovative Higher Education* 28: 119-136.
- Boydell KM, Glandstone BM, Volpe T, et al. (2012) The production and dissemination of knowledge: A scoping review of arts-based health research. *Forum: Qualitative Social Research* 13: Art. 32.
- Boyer E. (1990) *Scholarship Reconsidered: Priorities for the Professoriate*. Princeton, NJ: *Carnegies Foundation for the Advancement of Teaching, University of Princeton*.

- Burke WW and Litwin GH. (1989) A causal model of organization performance. In: JW Pfeiffer (Ed.) *The Annual Developing Human Resources*. University Associates, San Diego, CA.
- Byrne L, Happell B, Welch T, et al. (2013) 'Things you can't learn from books': Teaching recovery from a lived experience perspective. *International Journal of Mental Health Nursing* 22: 195-204.
- Callaghan L, Lea SJ, Mutton L, et al. (2011) Enhancing health students' understanding of generic research concepts using a web-based video resource. *Nurse Education in Practice* 11: 375-379.
- Cant RP and Cooper SJ. (2010) Simulation-based learning in nurse education: systematic review. *Journal of Advanced Nursing* 66: 3-15.
- Case JM. (2013) *Researching Student Learning in Higher Education: A Social Realist Approach*. London: Routledge (Society for Research into Higher Education (SRHE) Series).
- Chaudoir SR, Dugan AG and Barr CHI. (2013) Measuring factors affecting implementation of health innovations: a systematic review of structural, organizational, provider, patient, and innovation level measures. *Implementation Science* 8: 22.
- Clegg S, Kornberger M and Pitsis T. (2008) *Managing Organisations: An Introduction to Theory and Practice*., London: Sage.
- Coburn CE. (2003) Rethinking scale: Moving beyond numbers to deep and lasting change. *Educational Researcher* 32: 3-12.
- Cohn SF and Turyn RM. (1984) Organizational structure, decision-making procedures, and the adoption of innovations. *IEEE Transactions on Engineering Management* EM031: 154-161.
- Cook DA, Hamstra SJ, Brydges R, et al. (2013) Comparative effectiveness of instructional design features in simulation-based education: systematic review and meta-analysis. *Medical Teacher* 35: e867-e898.
- Cornelissen jP. (2005) Beyond compare: metaphor in organization theory. *Academy of Management Review* 30: 751-764.
- Crozier K, Moore J and Kite K. (2012) Innovations and action research to develop research skills for nursing and midwifery practice: the Innovations in Nursing and Midwifery Practice Project study. *Journal of Clinical Nursing* 21: 1716-1725.
- Cummings R, Maddux CD and Richmond A. (2008) Curriculum-embedded performance assessment in higher education: maximum efficiency and minimum disruption. *Assessment and Evaluation in Higher Education* 33: 599-605.
- Datnow A, McHugh B, Stringfield S, et al. (1998) Scaling-up the core knowledge sequence. *Education and Urban Society* 30: 409-432.
- Davidson LK. (2011) A 3-year experience implementing blended TBL: Active instructional methods can shift student attitudes to learning. *Medical Teacher* 33: 750-753.
- Davidson SC, Metzger R and Lindgren KS. (2011) A Hybrid Classroom-Online Curriculum Format for RN-BSN Students: Cohort Support and Curriculum Structure Improve Graduation Rates. *Journal of Continuing Education in Nursing* 42: 223-232.
- de la Croix A, Rose C, Wildig E, et al. (2011) Arts-based learning in medical education: the students' perspective. *Medical Education* 45: 1090-1100.

- Dearnley C, McClelland GT and Irving D. (2013) Innovation in teaching and learning in health higher education: Literature review. *Council of Deans of Health* September 2013.
- Denison DR and Spreitzer GM. (1991) Organizational culture and organizational development: A competing values approach. *Research in Organizational Change and Development* 5: 1-21.
- Dexter B and Seden R. (2012) 'It's really making a difference': how small-scale research projects can enhance teaching and learning. *Innovations in Education and Teaching International* 49: 83-93.
- Dooley KJ. (1997) A complex adaptive systems model of organization change. *Nonlinear Dynamics, Psychology, and Life Sciences* 1: 69-97.
- Dory V, Gagnon R, De Foy T, et al. (2010) A novel assessment of an evidence-based practice course using an authentic assignment. *Medical Teacher* 32: e65-e70.
- Dubrowski C, Kim JY, Desouza KC, et al. (2007) Elements of innovative cultures. *Knowledge and Process Management* 14: 190-202.
- Eales-Reynolds L-J, Gillham D, Grech C, et al. (2012) A study of the development of critical thinking skills using an innovative web 2.0 tool. *Nurse Education Today* 32: 752-756.
- Ellman MS, Schulman-Green D, Blatt L, et al. (2012) Using Online Learning and Interactive Simulation To Teach Spiritual and Cultural Aspects of Palliative Care to Interprofessional Students. *Journal of Palliative Medicine* 15: 1240-1247.
- Elmore RF. (1996) Getting to scale with good educational practice. *Harvard Educational Review* 66: 1-26.
- Evans N and Henrichsen L. (2008) Long-term strategic incrementalism: An approach and a model for bringing about change in higher education. *Innovative Higher Education* 33: 111-124.
- Everett LQ and Sitterding MC. (2013) Building a culture of innovation by maximizing the role of the RN. *Nursing Administration Quarterly* 37: 194-202.
- Fell P. (2010) Impact study: Developing essential knowledge and skills in health care students via mobile technology. [Online] London: Higher Education Academy. Available from: <http://www.heacademy.ac.uk/resources/detail/teaching-development-grants/case-studies/health-social-care-birmingham-city-university> [Accessed 27.05.14].
- Fernández AM. (2001) Innovation processes in an accident and emergency department. *European Journal of Innovation Management* 4: 168-178.
- Findlow S. (2008) Accountability and innovation in higher education: a disabling tension. *Studies in Higher Education* 33: 313-329.
- Fitch M, McAndrew A, Turner F, et al. (2011) Survivors teaching students: increasing awareness about ovarian cancer. *Canadian Oncology Nursing Journal* 21: 16-20.
- Fogstad L and Christiansen B. (2011) Moving the Boundaries: Peer Learning between Nursing and Physiotherapy Students. *Nordic Journal of Nursing Research & Clinical Studies / Vård i Norden* 31: 25-29.
- Fraser KD and al Sayah F. (2011) Arts-based methods in health research: A systematic review of the literature. *Arts & Health* 3: 110-145.

- Fugazzotto SJ. (2009) Mission statements, physical space, and strategy in higher education. *Innovative Higher Education* 34: 285-298.
- García-Morales VJ, Jiménez-Barrionuevo MM and Gutiérrez-Gutiérrez L. (2011) Transformational leadership influence on organizational performance through organizational learning and innovation. *Journal of Business Research* 65: 1040-1050.
- Gladwell M. (2008) *Outliers*, New York, NY: Little, Brown, and Company.
- Gopalakrishnan S and Damanpour F. (1996) A review of innovation research in economics, sociology and technology management. *Omega, International Journal of Management Science* 25: 15-28.
- Gordon F, Booth K and Bywater H. (2010) Developing an e-pedagogy for interprofessional learning: Lecturers' thinking on curriculum design. *Journal of Interprofessional Care* 24: 536-548.
- Group of Eight (Australian Universities). (2011) Role of universities in the national innovation system. *Discussion paper* <https://go8.edu.au/content/role-universities-national-innovation-system> [Accessed 27.05.14]
- Gunn C. (2010) Sustainability factors for e-learning initiatives. *ALT-J: Research in Learning Technology* 18: 89-103.
- Hagner PR and Schneebeck CA. (2001) Engaging the faculty. In CA Barone and RP Hagner (Eds.) *Educative leadership strategies: vol 5. Technology-enhanced teaching and learning* pp. 1-12. San Francisco, CA: Jossey-Bass.
- Halabisky B, Humbert J, Stodel EJ, et al. (2010) eLearning, knowledge brokering, and nursing: strengthening collaborative practice in long-term care. *CIN: Computers, Informatics, Nursing* 28: 264-273.
- Hale JF, Cahan MA and Zanetti ML. (2011) Integration of Basic Clinical Skills Training in Medical Education: An Interprofessional Simulated Teaching Experience. *Teaching & Learning in Medicine* 23: 278-284.
- Hammick M, Dornan T and Steinert Y. (2010) Conducting a best evidence systematic review. Part 1: From idea to data coding. BEME Guide No. 13. *Medical Teacher* 32: 3-15.
- Hammick M, Freeth D, Koppel I, et al. (2007) A best evidence systematic review of interprofessional education: BEME Guide no. 9. *Medical Teacher* 29: 735-751.
- Hannan A. (2005) Innovating in higher education: contexts for change in learning technology. *British Journal of Educational Technology* 36: 975-985.
- Harder BN. (2010) Use of simulation in teaching and learning in health sciences: a systematic review. *Journal of Nursing Education* 49: 23-28.
- Hargadon A. (2003) *How Breakthroughs Happen: The Surprising Truth about How Companies Innovate* Harvard Business School Press, Boston, MA.
- Harrison G, Mulloy B, Harris A, et al. (2012) On-line case discussion assessment in ultrasound: The effect on student centred and interprofessional learning. *Radiography* 18: 160-165.
- Hayward LM and Blackmer B. (2010) A model for teaching and assessing core values development in doctor of physical therapy students. *Journal of Physical Therapy Education* 24: 16-26.

- Helle L and Säljö R. (2012) Collaborating with digital tools and peers in medical education: Cases and simulations as interventions in learning. *Instructional Science* 40: 737-744.
- Hettema JE, Ratanawongsa N, Manuel JK, et al. (2012) A SBIRT Curriculum for Medical Residents: Development of a Performance Feedback Tool to Build Learner Confidence. *Substance Abuse* 33: 241-250.
- Holley KA. (2009) Interdisciplinary strategies as transformative change in higher education. *Innovative Higher Education* 34: 331-344.
- Hudson JN, Rienits H, Corrin L, et al. (2012) An innovative OSCE clinical log station: a quantitative study of its influence on Log use by medical students. *BMC Medical Education* 12: 111-111.
- Hurley RF. (1995) Group culture and its effect on innovative productivity. *Journal of Engineering and Technology Management*. 12: 57-75.
- Jayawardena A, Boardman A, Cook T, et al. (2011) Diffusion of innovation: enhancing the dissemination of the Ponseti method in Latin America through virtual forums. *The Iowa Orthopaedic Journal* 31: 36-42.
- Johannessen J-A, Olsen B and Lumpkin GT. (2001) Innovation as newness: what is new, how new, and new to whom? *European Journal of Innovation Management* 4: 20-31.
- Kanter RM. (2000) When a thousand flowers bloom: Structural, collective and social conditions for innovation in organizations. In *Entrepreneurship: The Social Science View* Ed. R. Swedberg, pp167-210. Oxford: Oxford University Press.
- Kelly MA and Fry M. (2013) Masters Nursing Students' Perceptions of an Innovative Simulation Education Experience. *Clinical Simulation in Nursing* 9: e127-e133.
- Kezar A. (2011) What is the best way to achieve broader reach of improved practices in higher education? *Innovative Higher Education* 36: 235-247.
- Kezar AJ and Eckel PD. (2002) The effect of institutional culture on change strategies in higher education: universal principles or culturally responsive concepts? *Journal of Higher Education* 73: 435-460.
- King N. (1992) Modelling the innovation process: An empirical comparison of approaches. *Journal of Occupational and Organizational Psychology* 65: 89-100.
- Kirkpatrick D. (1967) Evaluation of Training. In *Craig, R., Bittel, L. Eds. Training and Development Handbook*. New York: McGraw-Hill. pp. 131-167.
- Koponen J, Pyörälä E and Isotalus P. (2011) A comparison of medical students' perceptions of three experiential methods. *Health Education (0965-4283)* 111: 296-318.
- Kuh G. (2008) High impact educational practices: What they are, who has access to them, and why they matter. *Washington, DC: American Council on Colleges and Universities*.
- Kushner RF, Kessler S and McGaghie WC. (2011) Using behavior change plans to improve medical student self-care. *Academic Medicine: Journal Of The Association Of American Medical Colleges* 86: 901-906.
- Lachmann H, Ponzer S, Johansson U-B, et al. (2012) Introducing and adapting a novel method for investigating learning experiences in clinical learning environments. *Informatics for Health & Social Care* 37: 125-140.

- Lange JW, Mager D, Greiner PA, et al. (2011) The ELDER Project: Educational Model and Three-Year Outcomes of a Community-Based Geriatric Education Initiative. *Gerontology & Geriatrics Education* 32: 164-181.
- Larsson UE. (2007) Cultures of creativity: Birth of a 21st Century Museum. *Science History Publications/USA, Sagamore Beach*.
- Latta GF. (2009) A process model of organizational change in cultural context (OC₃ model). *Journal of Leadership & Organizational Studies* 16: 19-37.
- Lattuca LR, Terenzini PT, Harper BJ, et al. (2010) Academic environments in detail: Holland's theory at the subdiscipline level. *Research in Higher Education* 51: 21-39.
- Lau C-M and Ngo H-Y. (2004) The HR system, organizational culture, and product innovation. *International Business Review* 13: 685-703.
- Lefroy J, Brosnan C and Creavin S. (2011) Some like it hot: medical student views on choosing the emotional level of a simulation. *Medical Education* 45: 354-361.
- Leipert B and Anderson E. (2012) Rural nursing education: a photovoice perspective. *Rural & Remote Health* 12: 1-11.
- Lillyman S, Gutteridge R and Berridge P. (2011) Using a storyboarding technique in the classroom to address end of life experiences in practice and engage student nurses in deeper reflection. *Nurse Education in Practice* 11: 179-185.
- Lim BT, Moriarty H and Huthwaite M. (2011) 'Being-in-role': A teaching innovation to enhance empathic communication skills in medical students. *Medical Teacher* 33: e663-e669.
- Maloney S, Haas R, Keating JL, et al. (2011) Effectiveness of Web-based versus face-to-face delivery of education in prescription of falls-prevention exercise to health professionals: randomized trial. *Journal Of Medical Internet Research* 13: e116-e116.
- Maloney S, Storr M, Morgan P, et al. (2013a) The effect of student self-video of performance on clinical skill competency: a randomised controlled trial. *Advances in Health Sciences Education* 18: 81-89.
- Maloney S, Storr M, Paynter S, et al. (2013b) Investigating the efficacy of practical skill teaching: a pilot-study comparing three educational methods. *Advances in Health Sciences Education* 18: 71-80.
- Mareno, Bremner and Emerson. (2010) The use of audience response systems in nursing education: best practice guidelines. *International Journal of Nursing Education Scholarship* 7: Art. 32.
- Marion R. (1999) The edge of organization: Chaos and complexity theories of formal social organization. *London: Sage*.
- Marshall S. (2010) Change, technology and higher education: Are universities capable of organisational change. *Journal of Asynchronous Learning Networks* 15: 22-34.
- Mautner G. (2005) The entrepreneurial university: A discursive profile of a higher education buzzword. *Critical Discourse Studies* 2: 95-120.
- McFadden KL, Chen S-J, Munroe DJ, et al. (2011) Creating an innovative interdisciplinary graduate certificate program. *Innovative Higher Education* 36: 161-176.

McLoughlin JA, Wang L-CC and Beasley WA. (2008) Transforming the college through technology: A change of culture. *Innovative Higher Education* 33: 99-109.

Meng AL and Sullivan J. (2011) Interactive theater: an innovative conflict resolution teaching methodology. *Journal for Nurses in Staff Development* 27: 65-68.

Merton P, Froyd JE, Clark MC, et al. (2009) A case study of relationships between organisational culture and curricular change in engineering education. *Innovative Higher Education* 34: 219-233.

Mikrogianakis A, Kam A, Silver S, et al. (2011) Telesimulation: An Innovative and Effective Tool for Teaching Novel Intraosseous Insertion Techniques in Developing Countries. *Academic Emergency Medicine* 18: 420-427.

Mueller PS, Litin SC, Hook CC, et al. (2010) A novel advance directives course provides a transformative learning experience for medical students. *Teaching & Learning in Medicine* 22: 137-141.

Nicolle PS and Lou Y. (2008) Technology adoption into teaching and learning by mainstream university faculty: mixed methodology study revealing the "how, when, why and why not". *Journal of Educational Research* 39: 235-265.

Nie M, Armellini A, Witthaus G, et al. (2011) How do e-book readers enhance learning opportunities for distance work-based learners? *Research in Learning Technology* 19: 19-38.

O'Banion T, Weidner L and Wilson C. (2012) The impact of innovation. *Community College Journal of Research and Practice* 36: 4-14.

O'Banion T and Weidner L (2010) The nature of innovation in the community college. *League for Innovation in the Community College*, Phoenix, ISBN 97-1-931300-58-2.

Ozdalga E, Ozdalga A and Ahuja N. (2012) The smartphone in medicine: a review of current and potential use among physicians and students. *Journal of Medical Internet Research* 14: e128-e128.

Pawson R. (2013) *The Science of Evaluation: A Realist Manifesto.*, London: SAGE.

Pellico LH, Duffy TC, Fennie KP, et al. (2012) LOOKING Is Not SEEING and LISTENING Is Not HEARING: Effect of an Intervention to Enhance Auditory Skills of Graduate-Entry Nursing Students. *Nursing Education Perspectives* 33: 234-239.

Perry M, Maffulli N, Willson S and Morrissey D. (2011) The effectiveness of arts-based interventions in medical education: a literature review. *Medical Education* 45: 141-148.

Pham M, Chan B, Williams K, et al. (2010) Introducing clinical paediatrics to medical students: a novel hospital visitation programme involving kindergarten children. *Medical Teacher* 32: e276-e281.

Price RM. (2007) Infusing innovation into corporate culture. *Organizational Dynamics* 36: 320-328.

Quinn JB. (1985) Managing innovation: Controlled chaos. *Harvard Business Review* 63: 73-84.

Rapport MJ, Rodriguez J and Bade M. (2010) Use of a community volunteer program to develop value for patient-centered care in physical therapist professional education. *Journal of Physical Therapy Education* 24: 53-59.

Rees KL. (2013) The role of reflective practices in enabling final year nursing students to respond to the distressing emotional challenges of nursing work. *Nurse Education in Practice* 13: 48-52.

Reilly JM, Trial J, Piver DE, et al. (2012) Using Theater to Increase Empathy Training in Medical Students. *Journal for Learning through the Arts: A Research Journal on Arts Integration in Schools and Communities* 8:1.

Renes SL and Strange AT. (2011) Using technology to enhance higher education. *Innovative Higher Education* 36: 203-213.

Rieger KL and Chernomas WM. (2013) Arts-Based Learning: Analysis of the Concept for Nursing Education. *International Journal of Nursing Education Scholarship* 10: 1-10.

Riesen E, Morley M, Clendinneng D, et al. (2012) Improving interprofessional competence in undergraduate students using a novel blended learning approach. *Journal of Interprofessional Care* 26: 312-318.

Rigby L, Wilson I, Baker J, et al. (2012) The development and evaluation of a 'blended' enquiry based learning model for mental health nursing students: "making your experience count". *Nurse Education Today* 32: 303-308.

Roberts DH, Kane EM, Jones DB, et al. (2011) Teaching medical students about obesity: a pilot program to address an unmet need through longitudinal relationships with bariatric surgery patients. *Surgical Innovation* 18: 176-183.

Rogers EM. (2003) *Diffusion of innovations.*, London: Free Press.

Rogers TC, Zaninovic P, Urankar YR, et al. (2011) An Innovative HIV Training Program for Dental Students. *Journal of Dental Education* 75: 1426-1433.

Rosen MA, Hunt EA, Pronovost PJ, et al. (2012) In Situ Simulation in Continuing Education for the Health Care Professions: A Systematic Review. *Journal of Continuing Education in the Health Professions* 32: 243-254.

Ross S, Poth C-A, Donoff MG, et al. (2012) Involving users in the refinement of the competency-based achievement system: an innovative approach to competency-based assessment. *Medical Teacher* 34: e143-e147.

Rubin R, Kerrell R and Roberts G. (2011) Appreciative inquiry in occupational therapy education. *British Journal of Occupational Therapy* 74: 233-240.

Salmon G. (2005) Flying not flapping: a strategic framework for e-learning and pedagogical innovation in higher education institutions. *ALT-J: Research in Learning Technology* 13: 201-218.

Savage C, Amanali S, Andersson A, et al. (2011) Turning the tables: When the student teaches the professional — A case description of an innovative teaching approach as told by the students. *Nurse Education Today* 31: 803-808.

Schein EH. (1996) Three cultures of management: The key to organizational learning. *Sloan Management Review* 38: 9-20.

Schneckenberg D. (2009) Understanding the real barriers to technology-enhanced innovation in higher education. *Educational Research* 51: 411-424.

Schön DA. (1963) Champions for radical new inventions. *Harvard Business Review* March/April: 77-86.

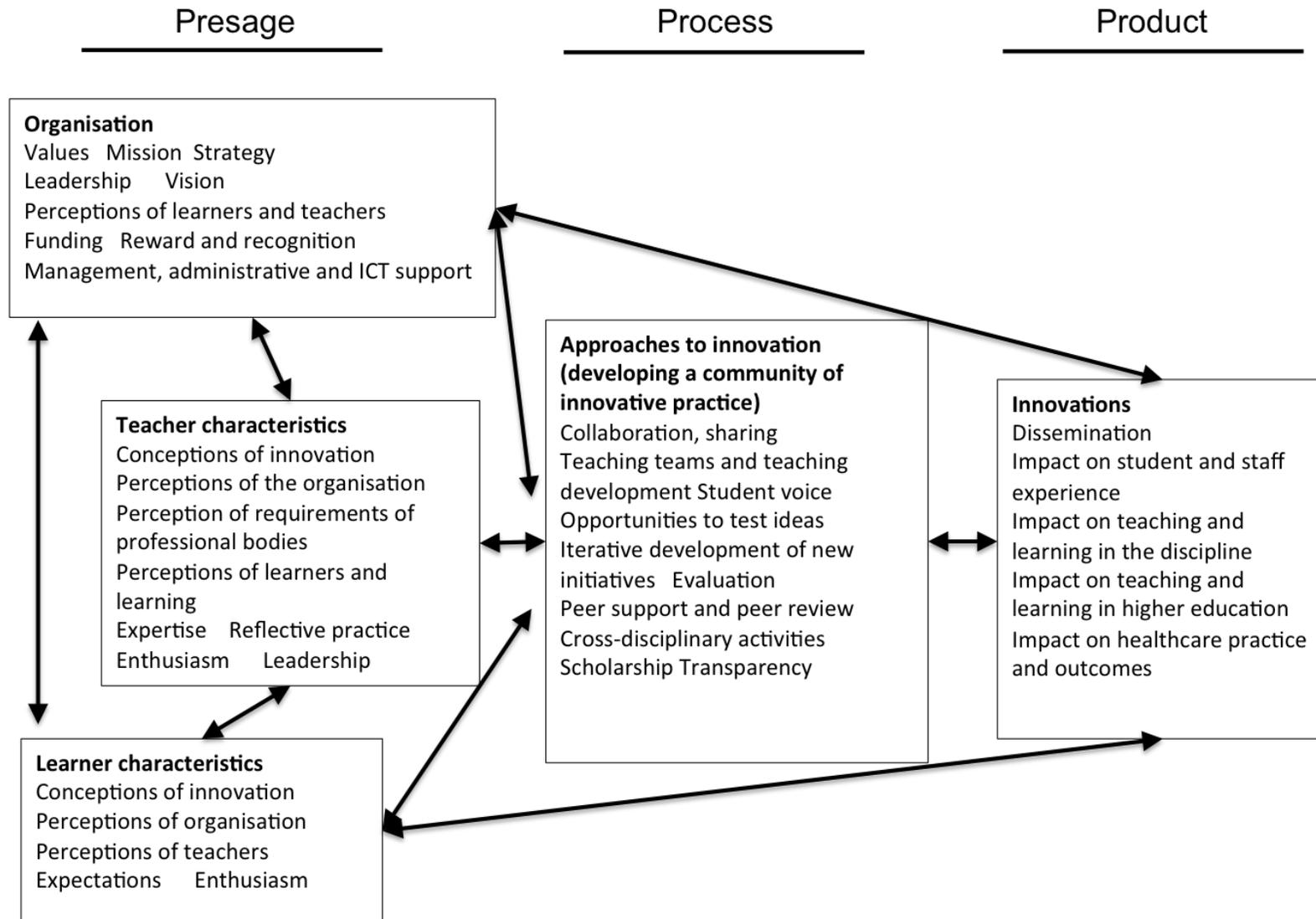
- Shield RR, Tong I, Tomas M, et al. (2011) Teaching communication and compassionate care skills: An innovative curriculum for pre-clerkship medical students. *Medical Teacher* 33: e408-416.
- Shiyanbola OO, Lammers C, Randall B, et al. (2012) Evaluation of a student-led interprofessional innovative health promotion model for an underserved population with diabetes: A pilot project. *Journal of Interprofessional Care* 26: 376-382.
- Sims-Giddens S, Helton C and Hope KL. (2010) Student peer mentoring in a community-based nursing clinical experience. *Nursing Education Perspectives* 31: 23-27.
- Sisk RJ. (2011) Team-Based Learning: Systematic Research Review. *Journal of Nursing Education* 50: 665-669.
- Smith, K. (2011) Cultivating innovative learning and teaching cultures: a question of garden design. *Teaching in Higher Education* 16: 427-438.
- Smith KR. (2006) Building an innovation ecosystem: Process, culture and competencies. *Industry & Higher Education* August: 219-224.
- Solomon P, Baptiste S, Hall P, et al. (2010) Students' perceptions of interprofessional learning through facilitated online learning modules. *Medical Teacher* 32: e384-e391.
- Spanier GB. (2010) Creating adaptable universities. *Innovative Higher Education* 35: 91-99.
- Steiner CJ. (1995) A philosophy for innovation: The role of unconventional individuals in innovation success. *Journal of Product Innovation Management* 12: 431-440.
- Sutin D, Rolita L, Yeboah N, et al. (2011) A Novel Longitudinal Geriatric Medical Student Experience: Using Teaching Objective Structured Clinical Examinations. *Journal of the American Geriatrics Society* 59: 1739-1744.
- Taylor R, Canfield P, Brew A, et al. (2007) Learning to be a scholarly teaching faculty: Cultural change through shared leadership. In: *Transforming a university: the scholarship of teaching and learning in practice*. Sydney University Press. <http://hdl.handle.net/2123/2134>.
- Terry J. (2012) Service user involvement in pre-registration mental health nurse education classroom settings: a review of the literature. *Journal of Psychiatric & Mental Health Nursing* 19: 816-829.
- The Higher Education Academy. (2008) Strategic Plan 2008-2013. ISBN 978-1-905788-79-8.
- Thomson NM, Campbell DE and O'Leary FM. (2011) Teaching medical students to resuscitate children: An innovative two-part programme. *Emergency Medicine Australasia* 23: 741-747.
- Thomson VA (1965) Bureaucracy and innovation. *Administrative Science Quarterly* 5: 1-20.
- Tierney WB. (1999a) Building the responsive campus: Creating high performance colleges and universities. *Thousand Oaks CA: Sage*.
- Tierney WG. (1999b) Faculty productivity and academic culture. In W. G. Tierney (Ed.) *Faculty productivity: Facts, fictions, and issues* (pp. 39-54). New York, NY: Falmer Press.
- Timmermans O, Van Linge R, Van Petegem P, et al. (2012) Team learning and innovation in nursing, a review of the literature. *Nurse Education Today* 32: 65-70.

- Tomas M and Castro D. (2011) Multidimensional framework for the analysis of innovations at universities in Catalonia. *Education Policy Analysis Archives* 19: 1-15.
- Trowler PR. (2005) A sociology of teaching, learning and enhancement: improving practices in higher education. *Revista de Sociologia* 76.
- Uchiyama KP and Radin JL. (2009) Curriculum mapping in higher education: a vehicle for collaboration. *Innovative Higher Education* 33: 271-280.
- van Hell EA, Kuks JBM, Dekker MJ, et al. (2011) The digital pen as a novel device to facilitate the feedback process. *Medical Teacher* 33: 497-499.
- Warner P, Jelinek H and Davidson PM. (2010) A university clinic: an innovative model for improving clinical practice. *Australian Journal of Advanced Nursing* 27: 38-42.
- Webster D. (2010) Promoting empathy through a creative reflective teaching strategy: a mixed-method study. *Journal of Nursing Education* 49: 87-94.
- Weick KE. (1976) Educational organizations as loosely coupled systems. *Administrative Science Quarterly* 21: 1-19.
- Whitworth A. (2012) Invisible success: Problems with the grand technological innovation in higher education. *Computers & Education* 59: 145-155.
- Wolff WI. (2008) "A chimera of sorts": Rethinking educational technology grant programs, courseware innovation, and the language of educational change. *Computers & Education* 51: 1184-1197.
- Zavertnik JE, Huff TA and Munro CL. (2010) Innovative approach to teaching communication skills to nursing students. *The Journal Of Nursing Education* 49: 65-71.
- Zein KA and Buckler SA. (1997) Dreams to market: crafting a culture of innovation. *Journal of Product Innovation Management* 14: 274-287.
- Zollner B, Sucha M, Berg C, et al. (2013) Pharmacases.de - A student-centered e-learning project of clinical pharmacology. *Medical Teacher* 35: 251-253.

Appendix I Kirkpatrick Hierarchy for Cultures of Innovation

Evaluating cultures of innovation using Kirkpatrick's Hierarchy		
Level 1	Reaction	Views on the innovation, views the culture in which it was developed; from learners, teachers, and the organisation
Level 2A	Learning – change in attitudes	Change in attitudes or perceptions to teaching and learning, to change, to innovation
Level 2B	Learning – modification of knowledge or skills	Acquisition of concepts and principles; skills of creativity, measured risk-taking, needs assessment
Level 3	Behaviour – change in behaviour	Transfer of learning to innovative approaches by others within, and outside, the organisation
Level 4A	Results – change in organisational practice	Wider changes in the organisation, attributable to a subculture of innovation
Level 4B	Results – wider change – in healthcare practice, in higher education practice	Improvement in patient care, healthcare provision, teaching and learning in higher education generally

Appendix II Presage-Process-Product (3-P) Model



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?



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