THEORETICAL PAPER

The need for systems change: reflections on knowledge translation and organizational change

Alison L. Kitson

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Correspondence to A.L. Kitson: e-mail: alk23@btinternet.com

Alison L. Kitson PhD RN FRCN
Supernumerary Fellow
Green Templeton College,
University of Oxford, UK

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Abstract
Title. The need for systems change: reflections on knowledge translation and organizational change.

Aim. This paper is a report of a study to explore the underlying assumptions, theories and metaphors used to describe healthcare systems and how knowledge is translated into practice.

Background. Despite over 40 years’ work on general systems theory, informed by critical social science, there is a mismatch between the theories used to explain and influence clinical practice in nursing and the way in which transferring new knowledge into practice is articulated.

Data sources. The analysis and emerging propositions were based on a critique of seminal texts published in English up to 2008 covering critical social science, action science, diffusion of innovations, practice development and the management of innovations.

Discussion. There is an implicit adherence to the world view that healthcare systems operate like machines, and much of the science generated around knowledge translation research tends to be logico-deductive. This is in direct contrast to the prevailing arguments of general systems theorists, who view the system more as an organism. Five propositions are posited: knowledge translation is a necessary but not sufficient mechanism to transform systems; the ‘system-as-machine’ metaphor is profoundly unhelpful to knowledge translation; the healthcare system is best viewed as a complex entity; successful innovation is a function of the level of local autonomy experienced by individuals, teams and the unit involved; innovation is most effective when it involves key stakeholders.

Conclusion. The purposeful integration of systems theory with knowledge translation theories and models may enable the application of research and new knowledge to practice to be speeded up.

Keywords: facilitation, innovation, knowledge translation, nursing, organizational change, practice, systems, theory
Introduction

The spread of new knowledge into practice is a slow and unpredictable process (Nutley et al. 2007). Much time and many resources have been put into trying to understand why individuals, teams and whole organizations do not embrace continuous change in a dynamic way, and why the introduction of new technologies, practices and processes are not part of a repertoire of behaviours, skills and attributes possessed by most workers. This phenomenon is experienced in every healthcare system across the world (Woolf 2008) and international research agendas are being developed to improve the uptake of new knowledge into practice (Graham & Tetroe 2007).

The significant impact context has on successful implementation strategies has recently been acknowledged in the discourse on evidence-based practice (Kitson et al. 1998, McCormack et al. 2002, Dopson & Fitzgerald 2005). Despite the considerable literature on organizational change and the management of innovations spanning the last 40 years, the prevailing conceptual models used to explain and test knowledge translation (KT) have tended to be linear in nature, most notably exemplified in Rogers’ diffusion of innovations theory (Rogers 2003).

What may not be so evident in the use of Rogers’ model and similar theoretical perspectives (Graham et al. 2006) is the consequence of the theoretical selection, particularly how healthcare systems are conceptualized, how change is effected and how different stakeholders operate together. As currently conceptualized, KT is a necessary but not sufficient mechanism to transform healthcare systems. This constitutes the first proposition. The assumption that KT is best described in a linear way is based on the implicit model, still prevailing in health care, that systems can be understood as machines – mechanical and technical – rather than organic, incremental and chaotic. This position constitutes the second proposition, namely that the system-as-machine metaphor is profoundly unhelpful to getting new knowledge into practice.

This view continues to be held implicitly, despite the growing theoretical and empirical body of knowledge in a variety of disciplines, and prohibits creative work being done around the following three propositions (see Table 1): the healthcare system is best viewed as a complex, interactive, organic entity where experimentation, experiential learning and reflection are central to creating a culture of innovation, improvement and consequently effectiveness (proposition 3). Using a variety of sources of evidence from nursing and management of innovation, a fourth proposition is put forward, postulating that successful translation of new knowledge into any system is a function of the level of local autonomy experienced by individuals, teams and the unit involved in the change. The final proposition attests that innovation is most effective in systems when it involves key stakeholders in personal development; control of the immediate physical resources and context; and increased autonomy over the external environment. The proposition also argues for such support to be provided by experienced and skilled facilitation, thus leading to the tentative hypothesis.

| Proposition 1: Knowledge translation (KT) is a necessary but not sufficient mechanism to transform healthcare systems |
| Proposition 2: The system-as-machine metaphor is profoundly unhelpful to our understanding of KT and to enabling new knowledge to be translated into practice |
| Proposition 3: The (healthcare) system is best viewed as a complex, interactive, organic entity where experimentation, experiential learning and reflection are central to creating a culture of innovation, improvement and consequently effectiveness |
| Proposition 4: Successful implementation (translation of new knowledge) into any system is a function of the local autonomy experienced by the individual, the team and the unit involved in the change process and their ability to translate this into purposeful and planned action |
| Proposition 5: Innovation of new ideas (knowledge translation) is most effective in systems when it involves key stakeholders in four central elements: education and personal development; control of immediate physical resources; control of the immediate context and increased autonomy and control of the external environment |

Emerging hypothesis:

Successful translation of knowledge into (healthcare) practice is a function of:

- The way in which participants (individuals) in the system understand the nature and characteristics of the new piece of knowledge
- The level to which they can make informed, autonomous decisions about how they can use the new knowledge to improve outcomes
- How they negotiate and renegotiate relations with others (individuals, teams, internal, external relations) in their system and
- How they attract necessary resources to sustain the changes/improvements in practice

This process is enabled by expert facilitators who simultaneously work with individuals, teams and the wider system in order to manipulate contextual factors (resources, context, culture, feedback and evaluation of performance) and support the experiential learning of individuals and teams in managing the new knowledge.
Background

Defining knowledge transfer

Graham et al. (2006) describe some of the more common terms used to outline what they call knowledge-to-action processes. Amongst the terms (knowledge translation, knowledge transfer, knowledge exchange, research utilization, implementation, innovation, dissemination and diffusion), they select knowledge translation (KT) as the preferred descriptor for the developing phenomenon. They argue that the primary purpose of KT is to address the gap between what is known from research and knowledge synthesis and how this knowledge finds its way into practice. They describe knowledge as that derived from scientific research and interactions as between researchers and research users. In this conceptualization, it is researchers who generate the knowledge and research users who receive it and implement it.

However, as Graham et al. identify, the definition they promote from the Canadian Institutes of Health Research (Canadian Institutes of Health Research 2005) is not explicit about what is meant by interaction and how system responses to new knowledge can be understood. The definition is based on a linear, rational model where knowledge is created by one set of experts and passed on to another set to be implemented. This logical, linear approach can be detected in a range of international and national policy initiatives.

National bodies have been set up in several countries (Rawlins 1999, Agency for Health Research and Quality 2001, Canadian Institutes of Health Research 2004) to collate, synthesize and publish evidence. National demonstration projects have been established to develop and disseminate models of best practice (Wallin et al. 2000, Dopson et al. 2001). Training programmes (Ibbotsen et al. 1998) and multiple initiatives have been tried and tested in demonstration projects and research programmes. At local level, a plethora of planned interventions has been tested, ranging from simple discrete interventions, e.g. use of reminders and audit and feedback, to the use of local opinion leaders and guidelines (Thomas et al. 1999).

Despite this, the evidence on the effectiveness of such interventions has been equivocal. Grol (2001) has commented that 30–40% of patients do not receive care complying with current scientific evidence. Grimshaw et al. (2004) have reported highly variable uptake in clinical guidelines. However, more recently researchers are beginning to acknowledge the complexity of the task of knowledge translation, both in terms of the interventions themselves and at the multiple levels at which these interactions need to be enacted (Grol et al. 2007).

From the early discussions (Kitson et al. 1998, McCormack et al. 2002) to the more complex statistical analyses of Estabrooks et al. (2007) and Cummings et al. (2007), it is evident that context plays a major part in getting research into practice. There is also greater acceptance of the organizational theory literature that context – however it is defined – is an important factor (Dopson & Fitzgerald 2005, Nutley et al. 2007). This has led to more debate about the increased use of theories to explain what is happening in KT.

The failure of simple, linear models and single item solutions has led groups such as ICEBeRG Group (2006) to begin to explore multiple, simultaneous interactions. Increasingly, the literature reflects growing awareness of factors relating to the social, organizational and economic contexts that influence the successful uptake of knowledge (Dijkstra et al. 2006).

KT is complex, multidimensional and multilayered. It involves knowledge generators, synthesizers, implementers and users: who they are, where they are, the relationships they set up with each other, how they negotiate and make sense of introducing the ‘new’ into the ‘current’ are all questions that require further investigation. Such a conclusion leads to the first proposition.

Proposition 1: Knowledge translation is a necessary but not sufficient mechanism to transform healthcare systems.

Data sources

Limitations to thinking about KT

Although the KT research community has recently begun to acknowledge complexity, Van de Ven et al. (1999) were one of the first research teams in the area of the management of innovations to demonstrate empirically that new ideas do not follow a logical flow from generation to implementation. They argued that the appealing logic of the traditional approach, characterized by Rogers (2003), has one major drawback: complex systems theory describes all ‘living systems’ as being in a state of ‘dis-equilibrium’ (Dooley 1997) and thus the linear approach does not reflect reality. Their research found no support for a stage-wise model of innovation development and no support for a linear model of adaptive trial-and-error learning, particularly during highly ambiguous and uncertain periods of the process.

If KT is not a logical, linear process, does this mean it is random? Would it be as effective to bombard every healthcare organization with guidelines, protocols, policies, procedures and evidence and wait to see what unfolds? Van de Ven et al. (1999) have described this state as the result of a non-linear dynamic system, arguing that the innovation journey is not stable, predictable or random.
This leads to a wider consideration of the ways in which the systems we work in are routinely and implicitly conceptualized (Miller & Rice 1967). Systems have been described as how resources and human effort are organized to achieve a set of tasks. Closed systems are self-contained, have an internal logic and predictability; open systems are involved in importing, converting and changing resources from one state to another (Miller 1993). Open systems accommodate relationships – indeed they are predicated upon a set of assumptions about the understanding of the relationship and the tension between individual and group and the individual and the organization.

Lewin (1947) argued that conventional models of scientific analysis could not uncover the ‘gestalt’ properties of complex human systems. Therefore there is a need for social systems to acknowledge that the structured properties of the dynamic whole are different from the structural properties of subparts. This ‘balancing’ between the individual and the group, the sub-system and the whole system, influenced the early social innovations movement (Rice et al. 1950) and has led the way to learning organization theory (Senge 1990) and the role of systems thinking in creating effective organizations (Plsek 2001).

Senge (1990) describes two sorts of complexity: detailed complexity – logical, specific and mechanical – and dynamic complexity. The characteristics of dynamic complexity are time (the same action may have dramatically different effects in the short and long term), location (an action can have one set of consequences locally and a very different impact on other parts of the system) and unintended, non-obvious consequences. The essence of systems thinking lies in a shift to seeing interrelationships rather than linear cause-and-effect chains, seeing processes of change rather than snapshots. Senge therefore advocates active involvement in reflection-on-action and drawing understanding and meaning from feedback on action and activity. This feedback moves to learning and the recognition of patterns that start to emerge. When the deeper structural and process patterns of systems are recognized we begin to learn how to influence those patterns.

This leads to the second proposition.

Proposition 2: The system-as-machine metaphor is profoundly unhelpful to our understanding of KT and of how to get new knowledge into practice.

The healthcare system-as-machine metaphor might appear anachronistic, but the experience of many patients and staff is that the systems in which they find themselves feel as if they are driven more by technology and rationalism to the detriment of other necessary qualities such as an emotional response, being present and drawing meaning from events (Brown et al. 2007).

Consequences of viewing the healthcare system as an ‘organism’ rather than as a ‘machine’

Moving from our logico-deductive paradigm into a more interpretive world of relationship and multiple perspectives can be disconcerting. If we agree with the logic and consider the evidence for a more interactive way of exploring KT, how do we go about developing and supporting this kind of research?

Is the debate about theory development and testing, as advocated by Estabrooks (2007), the ICEBeRG Group (2006), Grol et al. (2007), a step in the right direction? It is indeed important and timely if it embraces the open system, relationship approach. One bridge created between the traditional scientific world and the world of systems as organic entities is that of Van de Ven et al. (1999, 2000) empirical work. This leads to the third proposition.

Proposition 3: The (healthcare) system is best viewed as a complex, interactive, organic entity where experimentation, experiential learning and reflection are central to creating a culture of innovation, improvement and consequently effectiveness.

The innovation journey is defined as a sequence of events in which new ideas are developed and implemented by people who engage in relationships with others and make the adjustments needed to achieve desired outcomes within an institutional and organizational context (Van de Ven et al. 1999). This contrasts with the general expectation of the innovation process (as defined by Rogers 2003 and adopted by Greenhalgh et al. 2004) as involving sequential invention, development, testing, adoption and diffusion [For example, Greenhalgh et al. (2004) p582 define innovation as ‘a novel set of behaviours, routines and ways of working that are directed at improving health outcomes, administrative efficiency, cost effectiveness or users’ experience and that are implemented by planned and co-ordinated action.’ Emphasis added.].

Organizations undertake the innovation journey each time they invent, develop and implement new products, programmes, services or administrative arrangements, according to Van de Ven et al. (2000). Using a grounded theory approach, they derived a clear set of concepts for selecting and describing the objects to be studied on the journey and then developed systematic methods for observing change in the objects over time.

Important for KT research is the focus of this team’s work on process analysis and examining inter-relationships among variables at several points over time (Nisbet 1970, Pettigrew 1985, Van de Ven & Poole 1988). Their framework examined the development of innovations in terms of five key concepts – ideas, outcomes, people, transactions.
(relationships) and contexts. These concepts have been used to explain how the assumptions and observations about the core concepts diverge from orthodox literature on the subject and on the traditional views of KT research (Table 2) and how the innovation process works (Table 3).

Van de Ven et al. (1999) concluded that the process of innovation was messy and complex; it could not be reduced to a linear model of stages or phases. Despite articulation of the 12 steps (see Table 3), they caution against reducing the process to a planned, co-ordinated set of actions (as implied in Greenhalgh et al.’s 2004 definition). Rather, they explain the innovation process as a non-linear cycle of divergent and convergent activities that may be repeated over time and at different organizational levels to renew the cycle, if resources are obtained.

This cyclical pattern is not unique to innovation: Senge (1990) describes reinforcing (divergent) and balancing (convergent) behaviours and, within quality and safety literature processes such as PDSA (plan, do, study, act), there are implicit connections between periods of convergent and divergent behaviour (Thor et al. 2004). Equally, within action research and action science, spirals or cycles of learning, doing and reflection are well-recognized and embedded processes (Titchen & Manley 2006). However, how well this underlying dynamic is understood within KT is an important theoretical and practical question. Van de Ven and colleagues found that the divergent/convergent cycle was the underlying dynamic in developing a corporate culture for innovation, learning in innovation teams, leadership behaviours of top managers, building relationships with other organizations and developing (an appropriate) infrastructure for innovation (p213).

Building on the organizational learning theories of Senge and the innovation work of Van de Ven et al., there is a growing argument that KT should be viewed as another type of innovation process, which becomes subject to the vagaries of the process journey (see Table 4).

Do recent innovations in nursing reflect any of these elements?

In the nursing literature there have been at least two significant movements that are comparable to Van de Ven et al.’s (1999) description of the innovation journey (Table 2). These include the practice development movement (Kitson et al. 1996, Garbett & McCormack 2002, McCormack et al.

Table 2 Assumptions and observations about core innovative concepts

<table>
<thead>
<tr>
<th>Themes</th>
<th>Literature implicitly assumes</th>
<th>Van de Ven et al.’s (1999) interpretation</th>
<th>Traditional KT view</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ideas</td>
<td>One intervention operationalized</td>
<td>Reinvention, proliferation</td>
<td>Emerging from scientific research, refined and tested for rigour Synthesized and passed to practice world to implement</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Re-implementation, discarding and terminating</td>
<td>Experts developing the knowledge, opinion leaders in receipt and adapt to situation. Rest in the system influenced by leaders</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Many entrepreneurs distracted, fluidly engaging and disengaging over time in a variety of roles</td>
<td>Hierarchy of key influencers who are incentivized to embrace new ideas and permeate them through the system. Little explicit acknowledgement of changes in roles, relationships, ways of working</td>
</tr>
<tr>
<td>People</td>
<td>An entrepreneur with a fixed set of full time people over time</td>
<td></td>
<td>Acknowledge impact of environment and attempts to control its effect. Expectation that innovations can be introduced in resource neutral way Expectation that final results will demonstrate tangible, measurable improvements within a specified time frame</td>
</tr>
<tr>
<td>Transactions</td>
<td>Fixed network of people/firms working out details of new ideas</td>
<td>Expanding/contracting networks of partisan stakeholders who converge and diverge on ideas</td>
<td>Models describe a simple cumulative sequences of staging phases</td>
</tr>
<tr>
<td>Context</td>
<td>Environment provides opportunities and constraints on innovation process</td>
<td>Innovation process created and constrained by multiple enacted environments</td>
<td>Acknowledge impact of environment and attempts to control its effect. Expectation that innovations can be introduced in resource neutral way Expectation that final results will demonstrate tangible, measurable improvements within a specified time frame</td>
</tr>
<tr>
<td>Outcomes</td>
<td>Final results orientation as stable new order comes into being</td>
<td>Final results indeterminate – many in-process assessments and spin offs; integration of new order into old</td>
<td>Models describe a simple cumulative sequences of staging phases</td>
</tr>
<tr>
<td>Process</td>
<td>Simple cumulative sequence of staging phases</td>
<td>From simple to many divergent, parallel and convergent paths some related others not</td>
<td></td>
</tr>
</tbody>
</table>

Adapted with permission from Van de Ven et al. (1999).

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2004), and the studies on Magnet hospitals (Kramer & Schmalenbery 1988a, 1998b, Aiken et al. 1994). Table 5 provides a summary of these innovations in relation to the five themes derived from Van de Ven et al.’s work and a typology of how the interplay of divergent and convergent processes might unfold.

However, one issue not explicitly addressed by Van de Ven et al. (1999, 2000) but which has important implications for health care – and nursing in particular – is the question of what happens to innovations if they are introduced into contexts described as ‘underdeveloped’ (Towell & Harries 1993). Miller (1993) describes such contexts as having four key characteristics: lack of control over the immediate environment (victim rather than master); tightly integrated systems in operation (routines, attitudes, beliefs are all connected and fixed); relatively closed systems (automatic resistance to any sort of innovation and only certain sets of transactions allowed with other systems) and control over the external environment is nil (which often translates into feelings of apathy, worthlessness and impatience).

The term development in such situations would therefore imply a change in the direction of influencing and controlling the environment, thereby enabling the individual within the system to exert greater authority and control. Implicit in Van de Ven et al.’s work is this notion of intrinsic autonomy to act at local level. However, they do not deal with the matter explicitly – perhaps because the organizations studied all wanted to innovate and therefore were at a level of organizational readiness.

For nursing practice, the notion of an ‘underdeveloped community’ would seem to have some currency (Titchen & McGinley 2003, Down 2004, Manley 2004) and indeed the magnet initiative reflects organizations’ deliberate attempts to create environments that actively support innovation and enable local autonomy (Aiken et al. 1994). The genesis of the practice development movement (Garbett & McCormack 2002) was widespread dissatisfaction with the quality of care patients received and a growing sense that technological

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**Table 3** Twelve elements of the innovation journey

<table>
<thead>
<tr>
<th>Initiation period</th>
<th>Development period</th>
<th>Implementation/termination period</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Long gestation lasting several years in which seemingly random events occur that precede and set the stage for initiation of innovations</td>
<td>4. Initial innovative idea proliferates into multiple divergent ideas and actions</td>
<td>11. Adoption/implementation efforts do not wait until the innovation is completed – they occur throughout the whole development period</td>
</tr>
<tr>
<td>2. Coalescence of factors – internal and external – to create a ‘shock’</td>
<td>5. Setbacks and mistakes frequently encountered, resource and development timelines diverge; unattended problems ‘snowball’ into vicious cycles</td>
<td>12. Innovations stop when they are implemented or when the resources run out</td>
</tr>
<tr>
<td>3. Frantic search for resources to turn innovations into practical realities for adoption and diffusion</td>
<td>6. Criteria for success/failure change, differ between resource controllers and innovation managers, diverge over time, trigger power struggles between insiders and outsiders</td>
<td></td>
</tr>
<tr>
<td>7. Emotional roller-coaster for staff involved – euphoria, frustration, pain, closure also characterized by high part-time turnover of staff</td>
<td>8. Investors/top managers involved throughout the process, needed to solve problems</td>
<td></td>
</tr>
<tr>
<td>9. New interdependencies created as a result of the innovation which in turn start to impinge on the wider organization</td>
<td>10. Entrepreneurs often involved in creating the (new) infrastructure necessary to gain support and legitimacy for collective innovative efforts</td>
<td></td>
</tr>
</tbody>
</table>

Adapted with permission from Van de Ven et al. (1999).

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**Table 4** The divergent-convergent model of behaviour within innovation journeys

<table>
<thead>
<tr>
<th>Divergent behaviour</th>
<th>Theme</th>
<th>Convergent behaviour</th>
</tr>
</thead>
<tbody>
<tr>
<td>Branching and expanding process of exploring new directions</td>
<td>Launching</td>
<td>An integrating and narrowing process of exploiting a given direction – linear periodic pattern</td>
</tr>
<tr>
<td>Random, chaotic patterns</td>
<td></td>
<td>Implementing ideas and strategies</td>
</tr>
<tr>
<td>Creating ideas and strategies</td>
<td>Learning</td>
<td>Pushing ideas into currency</td>
</tr>
<tr>
<td>Inspirations and negotiations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Learning by discovery</td>
<td>Learning</td>
<td>Learning by testing</td>
</tr>
<tr>
<td>Exploratory search</td>
<td></td>
<td>Trial and error</td>
</tr>
<tr>
<td>Pluralistic leadership</td>
<td>Leading</td>
<td>Unitary leadership</td>
</tr>
<tr>
<td>Encouraging and balancing diverse views</td>
<td></td>
<td>Executing relations in established networks</td>
</tr>
<tr>
<td>Building relations and porous networks</td>
<td>Relationship building</td>
<td></td>
</tr>
<tr>
<td>Creating infrastructures for collective advantage – running in packs</td>
<td>Infrastructures operating within infrastructures for competing advantage</td>
<td></td>
</tr>
</tbody>
</table>

Adapted with permission from Van de Ven et al. (1999).
solutions promoted by quality improvement techniques did not sufficiently address the wider organizational learning and cultural issues. Whilst Van de Ven et al. explored change agent roles within the wider construct of leadership, they did not explore the concept of facilitation or the role of an external change agent who comes into an organization and attempts to support a change process (see Table 5).

In addition, Miller (1993) discussed the dilemma for the consultant involved in (rural) development work. This dilemma was that the change agent role could be perceived as both ‘top down’, i.e. the change agent being recruited to execute the objectives of the organization, as opposed to ‘bottom up’, where the change agent would negotiate with local groups what they wanted to achieve and would work with them to achieve it. Miller’s experience was that these two roles were not mutually exclusive and that an expert change agent knew how and when to enable both processes.

Thus, we are left with a strong argument, with supporting evidence, that making things better in systems is a complex, multilevel process. This includes agreement that context plays a major part in enabling or frustrating the success of the venture, and acceptance of the premise that much of the adoption of new knowledge is contingent upon learning styles and culture, levels of autonomy and support in terms of resource injection, and new ways of defining boundaries around power, groups, communication and action.

What is still left unanswered is whether external or internal change agents or facilitators can enhance or impede these emerging processes. Despite the growing body of research [e.g. Dijkstra et al. (2006), Gifford et al. (2006), Rhydderch et al. (2006), Stetler et al. (2006), Thor et al. (2004)], there is still little consensus on the nature of this intervention or process and therefore there is continued confusion over how such support to local teams can best be enabled.

This tension between the naturalistic enquiry of innovation researchers such as Van de Ven et al. and the more involved action researchers (e.g. Titchen & McGinley 2003) and, more recently, intervention scientists (Brown et al. 2007) raises the central conceptual issue. The KT scientific community knows that single intervention studies are of limited value (Greenhalgh et al. 2004), and exhortations to undertake more theory-based and complex multilevel intervention studies are increasing (Estabrooks 2007, Graham & Tetroe 2007, Grol et al. 2007). However, what does not

<table>
<thead>
<tr>
<th>Themes</th>
<th>Interpretation of the innovation process</th>
<th>Practice development movement</th>
<th>Magnet hospitals movement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ideas</td>
<td>Reinvention, proliferation</td>
<td>Emerging from clinical nursing practice, patient experiences and traditional research routes</td>
<td>Emerged from research on high performing organizations, transposed to acute hospital sector; emphasis on systems/contextual issues</td>
</tr>
<tr>
<td></td>
<td>Re-implementation, discarding and terminating</td>
<td>Proliferation of ideas</td>
<td></td>
</tr>
<tr>
<td>People</td>
<td>Many entrepreneurs distracted, fluidly engaging and disengaging over time in a variety of roles</td>
<td>Actors in system perceived as ‘stuck’, requiring support to innovate and creating own improvements – special internal and external support roles created to enable innovations to happen at local level</td>
<td>Innovation mediated through formal management executive structure with external organizations providing legitimacy</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Re-interpretation Re-implementation</td>
<td></td>
</tr>
<tr>
<td>Transactions (relations)</td>
<td>Expanding/contracting networks of partisan stakeholders who converge and diverge on ideas</td>
<td>Creative problem solving and action supported by local facilitation coached by external experts</td>
<td>Fixed networks of people working out new ideas</td>
</tr>
<tr>
<td>Context</td>
<td>Innovation process creates and constrained by multiple enacted environments</td>
<td>Seen as key element within innovation process. Elements of context – culture, leadership part of change process</td>
<td>Central to transformation process itself</td>
</tr>
<tr>
<td>Outcomes</td>
<td>Final results indeterminate – many in-process assessments and spin-offs; integration of new order into old</td>
<td>Final results often seen as indeterminate – seen as a weakness in traditional KT endeavours- yet often reporting multiple in-process spin-offs, changes in teams, cultures, contexts, working patterns. Issue of time sensitivity to test for outcome changes</td>
<td>Final results relate to observable improvements in patient outcomes (mortality and failure to rescue) as a way of defending, justifying the shift in the power balance, relations at local level</td>
</tr>
<tr>
<td>Process</td>
<td>From simple to many divergent, parallel and convergent paths some related others not</td>
<td>Complex, multilevel, multifaceted, guided and supported through expert external and internal facilitation</td>
<td>Processes not viewed as important as outcome change viewed as staged, logical, sequential</td>
</tr>
</tbody>
</table>
The way in which participants (individuals) in the system understand the nature and characteristics of the new piece of knowledge and accept it; • The level to which they can make informed, autonomous decisions about how they can use the new knowledge to improve outcomes; • How they negotiate and renegotiate relations with others (individuals, teams, internal, external relations) in their system and • How they attract necessary resources to sustain the changes/improvements in practice.

This process is enabled by expert facilitation where trained individuals (change agents, facilitators, knowledge brokers, consultants) simultaneously work with individuals, teams and the wider system to manipulate contextual factors and support the experiential learning of individuals and teams in managing the new knowledge.

In this emerging hypothesis it is argued that the innovation process is inherently so complex that it requires trained experts to enable it to happen effectively. Because it is a process, and because it involves many actors over time, the theoretical and methodological challenges posed for KT research are significant.

Discussion

In addition to systems theory, theories of innovation and learning organization theory, the development of critical social science theories has moved our thinking from the linear, objective view of the world to a view that is much more conditional, contextual and relational in nature. Critical social science theories and the types of human interest they serve (Habermas 1972), together with models of action research (Grundy 1982) and the refinement and extension of methods of evaluation (Guba & Lincoln 1989, Pawson & Tilley 1997, Manley et al. 2005, Pawson et al. 2005), attest to the argument put forward in this paper that simple, deductive ways of understanding how knowledge is generated and then gets into systems falls short of describing reality.

The discourse on KT science has not routinely drawn on such theoretical perspectives, selecting instead the more traditional discourse of logical positivism and, in particular, very discrete theories that describe one particular intervention, e.g. planned action theory. However, the growing evidence from KT activity is demonstrating that single intervention studies and attempts to control multiple contexts are fraught with theoretical and methodological challenges. At its core, the dilemma may be one of philosophy – how to view the world of practice and how to create conceptual frameworks about the range of knowledge needed for practice.

This shift can also be detected in the growing debates around what is termed Mode 1 and Mode 2 Knowledge
What is already known about this topic

- There has been little explicit use of general systems theory and critical social science in knowledge translation research.
- ‘Context’ is an important construct in understanding and influencing successful knowledge translation.
- Theories need to be used to inform knowledge translation research, but what sort of theories and how this could be done are still not clear.

What this paper adds

- An integration of systems theory and knowledge translation research to produce new ways of framing research questions.
- Use of a conceptual framework from the management of innovation literature to frame studies in health care.
- New propositions and a hypothesis to test the dimensions of knowledge transfer in practice.

Implications for practice and/or policy

- Researchers, practitioners and policymakers need to acknowledge that the healthcare system which they are seeking to change and improve needs to be viewed not as a machine but as an organic, interactive entity.
- Innovation is most likely to succeed when it involves expert facilitation and key stakeholders.

(Gibbons et al. 1994, Nowotny et al. 2001) in which it is argued that the production of knowledge and the process of research are being radically reformed. The traditional paradigm of scientific discovery (Mode 1) has to engage with more novel ways of producing knowledge (Mode 2). Mode 2 knowledge generation is characterized by much more active involvement of all key stakeholders in the articulation of the research problem, development of the methodologies, how the knowledge is communicated and how users are defined and engaged. Other characteristics include its transdisciplinary nature, the multiple contexts in which knowledge can be generated, its reflexive nature and the need for new ways of evaluating the quality of the research product, i.e. a move from the notion of levels of evidence to a wider appreciation of knowledge in context.

KT sits at the centre of this philosophical debate; from the genesis of the evidence-based medicine movement, KT research has been profoundly influenced by the logical-positivist tradition. However, as exemplified in this paper, both the organizational theory research literature (in particular, the management of innovation) and the nursing innovation research literature present a world view that is much broader in perspective and more in tune with Mode 2. If KT research were to acknowledge explicitly the complex, dynamic nature of the healthcare context into which knowledge is introduced, it would dramatically change the sorts of theories it used, the metaphors deployed and the methods selected.

By making explicit a number of the embedded assumptions that guide our thinking about the systems in which we work and the way we deal with new knowledge, it may be possible to shift the debate and move it to one which acknowledges complexity and the multidimensional nature of practice settings. KT research would then be evaluated alongside the more traditional approaches used in critical social science – action research, co-operative enquiry, realist evaluation – as well as looking at which parts of the traditional positivist approach to knowledge generation and implementation are appropriate.

Further conceptual and methodological areas are the extent to which KT and organizational change researchers actively engage in the change process itself. The emerging hypothesis from the five propositions put forward in this paper implies that it is almost impossible for effective KT to happen without some form of expert facilitation. One conceptual framework that incorporates this approach is the Promoting Action on Research Implementation in Health Services Framework. Kitson et al. (2008) have argued that facilitation as an intervention has to be context, process and time-specific – each individual and team need to come to a conclusion about the particular support they need to implement an innovation successfully – oscillating between the convergent and divergent behaviours of solving problems, unfreezing situations and moving things forward.

Implications for nursing

Nursing has a long history of exploring the factors that impede or enhance the uptake of new knowledge into practice (Estabrooks et al. 2006). Trends within the discipline have shifted from a focus on the individual and their characteristics (education, awareness of research, skills and attributes) to appreciation of the impact of the wider environment. What does not seem to have happened, and what is argued in this paper, is that conceptualizations of KT and systems theory also have to change. Despite the fact that nursing science is no stranger to critical social science, and indeed it has heavily influenced the practice development movement, there is still a lack of appreciation in the wider KT research community of these approaches.
By embracing research approaches used in organizational science, as exemplified by Van de Ven et al.’s work (but also by Dopson & Fitzgerald 2005 and Nutley et al. 2007), a wide range of innovative theories and methods are opened up to KT research in nursing. With the trend for funding agencies requiring greater accountability from researchers about how they have helped to translate their research into practice, such discussions are both timely and appropriate. However, it is important to acknowledge that KT is best undertaken in a team which means that the principles expounded are equally appropriate for all healthcare disciplines.

Conclusion

To change our behaviour within systems, we have to change the way we think about the systems themselves, the way new knowledge is created and how we become involved in the process of knowledge translation. Instead of implicitly accepting the traditional notion that organizations are rational, logical places, we need to consider the wider evidence from critical social science and other domains which reflect a different reality.

In such discourse there is the growing expectation from healthcare funding agencies and healthcare systems that new knowledge will find its way expeditiously into practice. It therefore behoves the KT research community to look differently at what works, and what does not. Researchers are increasingly required to demonstrate how their research makes an impact in practice and equally governments are increasingly questioning the return on investment in health care.

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A.L. Kitson


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