Complexity and Professional Education: Rethinking Knowledge, Practice and Responsibility (0024)

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Across professions such as health care, social work, engineering, management and teaching, higher education providers of pre-service and continuing professional education struggle to address the growing complexity of everyday practice conditions. Multiple and contradictory directives for professional knowledge and professional responsibility are invoked by a myriad of stakeholders from patients and policy makers to virtual transnational knowledge resources. Amidst this complexity is the growing demand for multi-professional service, which brings new layers of complexity through conflicts among professional knowledge traditions and boundaries of practice.

To address these complex patterns of professional knowledge and responsibility within and across particular systems of practice, HE teachers and researchers have adopted concepts from complexity science such as emergence, mattering processes and materialities of knowledge, nested systems, and non-linear dynamics to better understand these patterns and to suggest new approaches for professional education and continuing professional development (Fenwick et al, forthcoming 2011). This paper draws from HE studies of CPD practice that show how complexity science can be useful in understanding the changing demands for professional learning, and in designing educational supports for today's professionals. Three areas for application of complexity will be discussed: articulating complex patterns of professional knowledge, supporting locations for professional knowing within undecidability, and amplifying new opportunities for professional creativity. For purposes of this abstract, selected examples in each category are provided below.

Articulating complex patterns of professional practice and knowledge

To address complex patterns of professional practice, particularly interdisciplinary practices in different contexts in relation to social phenomena, the concepts of emergence and non-linear dynamics of complexity science have been employed both to better understand the patterns and to suggest action such as educative action. One example is ISIS, a project of the Tobacco Control Research Branch in the US (Trochim et al 2006), where a transdisciplinary group of professionals use complexity to conduct their work around questions such as:

> How can the flow in *both* directions between research and practice be optimized? How can systems … be best characterized to be useful to the public health community? Which approaches can be used for better understanding and optimization of networks? Through which strategies do information and knowledge become the currency for change? (Trochim et al 2006: 3)

In summarizing the utility of complexity science for examining interprofessional practice and education, Klein (2004) argues that it affords a new dialogue of science and humanities, new forms of knowledge and problem solving. Klein suggests that in complex problems, professionals need to investigate a nexus of phenomena using a variety of analytic dimensions at

once. She shows how complexity can offer multiple methods to trace the disorderings and simultaneous orderings emerging on different levels and among different stakeholders in the system. Complexity's language of emergence, incompressibility, feedback loops and irreversibility help professionals to understand the interrelationships among phenomena, and offers an 'interlanguage' to bridge professional disciplines.

Supporting locations for professional knowing within undecidability

Complexity science in Prigogine's terms (1997) shows that in any complex adaptive system comprising professional practice, the non-linear dynamics at play mean that a series of choices is available at each moment, *to each and every interacting element of the system*, human and nonhuman. Not only are choices being made by these entities in ways that are not accessible to human consciousness, but also the forces affecting these choices are often not visible, or even present, in the system at any given moment. Once a choice is made, it is irreversible – because that choice immediately spawns a new set of choice-making activities among entities affected by that choice. This is the concept of emergence, where novel patterns are continually emerging in surprising ways that often refute expectations of causality. The result is an essential undecidability for practice, for knowledge, and for education (Osberg, Biesta and Cilliers 2008). The problem for professionals is the expectation that they will solve problems, using 'evidence' obtained from past practice and distant contexts. This knowledge is not about adapting with emerging complexity, but about prediction and control.

However, some have turned to complexity science to propose alternate approaches for supporting professional knowledge, which suggest new approaches in higher education. Haggis (2009), for instance, has shown how teaching professionals complexity concepts helps them understand the simultaneities in which they must work, as well as to open more flexible, emergent forms of response. In social work education, Wolf-Branigin (2009) shows how complexity can help students to develop capacities such as learning how to encourage connectivities among the multiple agencies and emerging social movements in particular communities, or focusing on resiliency in themselves and their clients rather than control and solution. McMurtry (2007) introduced a complexity-based approach to interprofessional education in health care. His study traces how HE teachers amplified diversity of individual elements, such as the important disciplinary distinctions among professionals' epistemologies and material practices, within conditions of sufficient 'redundancy' and openness. The teachers also designed learning activities and assessment approaches using complexity's nested systems concepts, fostering students' (and their own) awareness of their own actions' effects on different systems in which they participate. Taken together these dynamics, claims McMurtry (2007), seem key to fostering the trust-within-diversity - that is critical for supporting professional knowing amidst undecidability.

Amplifying new opportunities for professionals' creativity and responsibility

Regulatory agencies, audit regimes, unrealistic public expectations and depleted resources seem to increasingly constrict professional autonomy and spaces for care,

concern, and creativity. Yet complexity – and the dynamic of emergence – require continuous improvisation, choice and interconnectivity. And, researchers working with complexity in professional education have shown how openings are continuously available for professionals' judgments within the very dynamics of the complex systems in which they are embedded. Complexity theorist Karen Barad (2003) writes that:

> Particular possibilities for acting exist at every moment, and these changing possibilities entail a responsibility to intervene in the world's becoming, to contest and rework what matters and what is excluded from mattering. (Barad 2003: 827)

The notion of emergence also invites considerations about what sorts of professional responsibility might arise out of entanglement in volatile processes, and what forms of novelty and surprise might arise out of professionals' response and responsibility in emergent processes.

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