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The Complexity of Research, and Researching Complexity: A Review of the Options

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Abstract

The search for understanding of the complex nature of the world has spawned deeper specialisation and greater diversification in scientific research, together with greater collaboration. A review of the literature suggests that where research is undertaken by different disciplines, misalignment between the respective understandings of the ontology, epistemology and axiology (o-e-a) underpinning the research is not uncommon. To explore this anomaly a mind-map was developed representing how research methodologies were underpinned by o-e-a, drawing on explanations from 35 prominent sources. This initial mind-map was then shared online (DOI: 10.13140/RG.2.2.13395.50721) and discussion was invited. A dozen experienced, international researchers, representing business administration/economics, logistic, operational research, sociology, environmental science, medicine, education, architecture and computing, critiqued the mind-map, and these contributions and supporting references were used to further chart the challenges of such collaborative working. The prevailing research approach to technical/scientific challenges continues to build on the conventional 'Newtonian' research paradigm, premised on physical entities being controllable, measurable, predictable and with a linear logic to equilibrium. The nature of collaboration appears to be in transition from multidisciplinarity to interdisciplinarity categorised by more integrative collegiate relations between disciplines. Such approaches have not however proven sufficiently robust to address the challenges of the complexity characterising socio-ecological systems. Such systems typically involve multiple diverse stakeholders, multiple uncertainties – unknown unknowns rather than missing data – and widespread disagreement and weak capacity amongst decision-makers. Collaboration in such circumstances needs to take the form of integrative research between scientific and non-scientific communities allowing for new and iterative forms of learning and problem-solving to emerge. This requires researchers to step outside their comfort zone (i.e. 'research as usual') to understand scientific questions through the blend of different perspectives thrown up by complexity, and is termed 'trans-disciplinarity'. Examples of such framing are provided by case studies on water security and catchment governance in Southern Africa. The challenge to academia where research extends beyond scientific disciplines to address issues of real-world complexity, is establishing whose o-e-a counts – that of the researchers, or the knowledge users? The paper argues for greater awareness of these broader contextual dimensions amongst the research community. Bound to epistemological, ontological, and axiological orthodoxies, research struggles with growing socio-ecological complexity. Academia generally, but research students, in particular, need to be facilitated in understanding the implications of complexity, in recognizing diverse worldviews and in respecting the plurality of knowledge, in their efforts to create a deeper, more effective understanding of reality.

Keywords: *Complexity, Discipline Collaboration, Research Methodologies, Ontology Epistemology Axiology*

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