Complexity theory and higher education: model, metaphor and meme?

Whilst there is little doubt that higher education is complex, and even *supercomplex* there remains doubt as to the usefulness of considering it in the light of complexity theory. Whilst there are arguments that complexity theory is not a good foundation for educational research, there are also a plethora of publications and conference presentations founded on its utility in relation to higher education (for example, Tosey, 2002; Nordtveit, 2007; Haggis, 2003; Room, 2016; Doolittle, 2014; Mason, 2008; Jorm, 2016).

In this paper, I begin by considering Kuhn's (Mason, 2008) arguments that complexity theory has value to educational research. Kuhn deals with two arguments:

> The first is that..complexity…draws on images and metaphors from mathematics and science…deemed not applicable to work in…education. On this argument, recourse to complexity as an organising framework (paradigm) would not be desirable in educational research. The second objection is that many discourses outside of science and mathematics…provide adequate, equivalent or superior means of addressing similar ideas to insights claimed by complexity. This view positions complexity as redundant. (Kuhn in Mason, 2008:185)

I find Kuhn's answers unpersuasive. In the educational literature all too often the connection between concepts, partially definitive of complexity theory, e.g., emergence, or systems theory, are used without reference to the wider demands of their theoretical use in the natural sciences. Further, it is not clear what added explanatory power complexity theory adds to the analysis of educational practices. Kuhn's claim that the different linguistic signifiers utilized of itself justifies the view that it must add something of value to the analysis is insufficient. Two different languages utilize different signifiers, but unless one accepts a radical view of non-translatability they can both be describing the same activity in the same ways.

I argue the models of complexity theory drawn from physics/mathematics, computation (e.g. non-Von Neumann computers, and biology (e.g., ant colonies) have two further distinct problems for educational research. The first is that they depend on individuals to be incapable of autonomous, intelligent action. The second is that successful positive emergence in systems is random and depends on a significant number of negative outcomes. It would seem that intelligent planning is preferable to complexity led approaches to educational practice or research.

In the main section of the paper I review Luhmann's 1990-1 series of lectures 'An Introduction to System Theory' in sociology (recently available in English translation, Luhmann, 2013). Luhmann begins with a genealogical consideration of system theory in sociology with a particular focus on Parsons. A social system, Parsons wrote, consists of 'a plurality of individual actors interacting with each other in a situation which has at least a physical or environmental aspect…motivated in terms of a tendency to the 'optimisation of gratification' and whose relation to their situation, each…is defined and mediated in terms of a system of culturally structured and shared symbols (Parsons, 1951:5-6). Luhmann argues that whilst there are flaws in Parsons' theory of 'Action is system', it offers a strong foundation for a restoration of systems theory in sociology. However:

Action…does not meet the requirements for functioning as a system-producing type of operation. It presupposes a subject who acts and, unlike communication, cannot generate its own continuance. Furthermore, action in not limited to social contexts but can also occur in solitary operations. Finally, it is difficult to determine the limits of actions. One the one hand, actions are not be easily separated from motivations and, on the other, it is not clear which consequences of an action are still part of it. (Luhmann, 2013: xi)

Luhmann therefore offers an account based on difference and communication. This account reflects the need of a system to be 'two sided' in which the system is bounded and different from the environment, and which can be analyzed from within (internally) and externally. He summarizes his argument thus:

The first statement concerns the analysis of the form: a system is difference. The second statement says that a system needs only one single operation, one single type of operation, in order to reproduce the difference between system and environment if the system is to continue to exist....In the case of the social system, we have identified communication as this type of operation. (Luhmann, 2013:54)

Communication is thus the single feature of social systems which is satisfies the principle of 'autopoiesis'; the need to be self-replicating and self-maintaining. Luhmann thus (*pace Maturama)* sees autopoiesis as more than a feature of biological systems, and not reducible to such systems. It is centered on communication 'conceived as a synthesis of information, utterance and, understanding (Luhmann, 2013:53) which is inherently social.

In Luhmann we have an account of a complex system which is constructed to deal with the social system of intelligent human actors. Further, in his analysis of Parsons and Parsonian 'action' he explores the ways in which systems accounts offer a different approach to understanding social relationships and social situations. Rather that focus on the relation between educational research and physics/mathematical theory, Luhmann offers a sociologically robust form of complexity theory. It is one which explicit identifies the ways in which this account is distinct from alternative ways of framing the analysis of educational practices, and institutions. Further, it deals with my own concerns with the lack of engagement, in the educational literature, with the problems of the intelligent autonomous agents. Whilst such an agent is problematic for natural scientific models of complexity theory, there is no such problem in a sociological one.

I conclude by identifying the possible value for higher education in utilizing this Luhmannian inspired model of complexity theory.

References

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