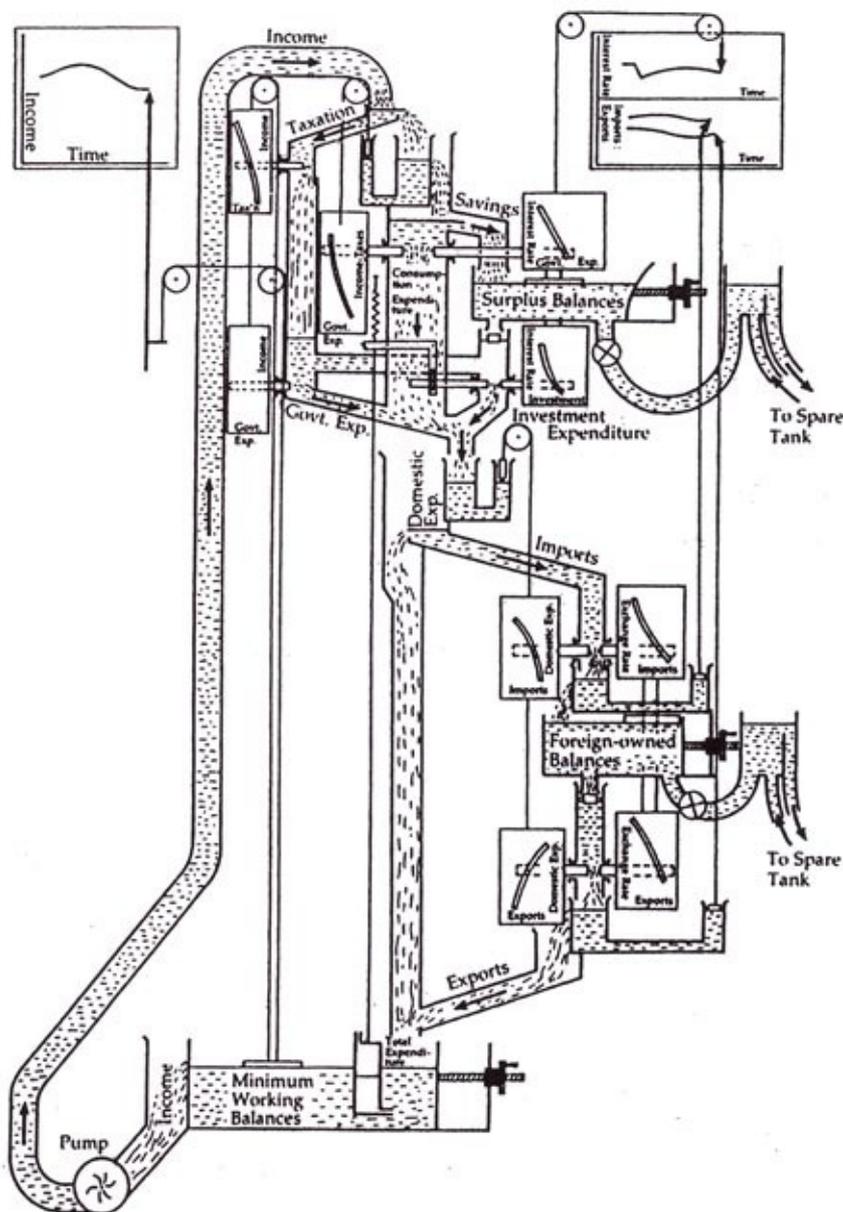


Education and Complexity and the Era of the Incurious

A White House advisor to former President George Bush, David Frum described him as 'smart' but 'incurious'. I must be careful about what I say about an American President in the USA. However much our own leaders may appal us we do not generally like to hear criticism from a foreigner. I will therefore say no more apart from the fact that President Bush seems in many respects to be a man of our age. Whereas in the past we saw the development of theoretical perspectives on education and learning as exciting and developmental, when we welcomed alternative interpretations and explanations for what was happening in our schools and universities, we now see these issues as irrelevant or inapplicable. Jean Lyotard has told us that the grand narratives are dead and that research is legitimated in the context of 'performativity'. Our understandings are no longer subject to consideration in terms of their truth values but rather at the mercy of 'pragmatic valencies' (Lyotard 1984). We no longer live in an age of progressive understandings but rather one of technical 'improvement' and if this is the case then we no longer need to be curious, just smart.

In the UK, and I believe within the USA, this pragmatic or instrumentalist turn has taken the form of the 'school effectiveness' movement, or the 'SE paradigm'. Under this perspective schools are seen in terms of input and output variables. Both sets of variables can be sensitive to a wide range of possibilities but the important point to make is that they are clearly identifiable, preferably measurable, and as such they can be used as indicators in relation to judgements about efficiency. The boundaries within which our enquiry takes place can be drawn. Between the input and output variables the supposition is that relatively clearly defined patterns of linear relationships can be established. Variations in terms of input variables may be observed in their effects on the system and sophisticated multi level analytical procedures are employed in the 'measurement' of the system and its effectiveness. This way of understanding how social systems work is not new. Carl Menger in 1883 suggested that economies functioned on the basis of the 'sum total of consumer choices and the relations between them operating as a function of the individual actions which

produced them'. In order to illustrate this process in the context of macro economic systems he produced the following diagram (Smith 1998;142).



By the careful control of certain variables the whole system can be recalibrated to other higher of operational efficiency.

There is something very smart about such models but they fail in two fundamental respects. Firstly they assume that the system, that they are meant to describe, is relatively bounded, or at least amenable to being seen in terms of boundaries, and that key variables can be isolated and operated upon. They

further fail to allow for irregularity in terms of the interactions within the system from one moment to the next. Whereas there may be a degree of constancy between causes and effects in mechanical systems, indeed they could not be constructed without the assumption of this, this is not the case with social ones. Whereas mechanical systems roughly accord with Newtonian view that energy is conserved, social systems seem to produce substantial energy changes as a result of all but invisible variations in the conditions of the system. Karl Popper sought to explain the world in terms of 'clouds and clocks'. He argued that all phenomena could be described on a continuum between perfectly determinate (clocks) and perfectly indeterminate systems (clouds) and human freedom and creativity he saw as an outcome of a complicated interaction between the two (Popper 1979). Indeterminacy is clearly a feature of some events in reality (Popper referred to quantum mechanics for his example) but we do not need the arbitrary indeterminacy that Popper was thinking about in order to explain unpredictability. Complexity theory draws our attention to the qualities of the system that emerge from the interaction between variables and that could not have been predicted prior to that interaction. The causal origins of the emergent property can only be explained historically thus emergence cannot be predicted. In complex systems energy flows are unpredictable and inconstant and as such, their development is unpredictable. This does not mean that they are uncontrollable or anarchic in character but it does make them a source of curiosity. Observing complex systems is more like studying an artist painting a picture than watching a mechanic servicing an engine, or more like watching a battlefield rather than a parade.

The second failing, or perhaps limitation, of input-output models, is that in seeing social systems in this way, attention is drawn away from questions about what we actually want our system to do. There is a tendency to see the system as preset for certain kinds of outcome and control is seen in that context only. The choices and behaviours that are the key factors determining what happens in the system are evaluated purely in terms of the given outcomes around which the system is designed. In the case of education, some kinds of input factors are likely to be put outside the boundaries of the enquiry. These factors are generally those that are either considered relatively intractable such as the social and cultural conditions that prevail in society at large, or are factors that are considered beyond the remit of the educational research, political decisions

about resourcing and features of governance. Outputs are similarly subject to boundaries. In the UK pupils attainment is invariably associated with performance in standardised tests administered at given stages in the childrens' education, attitudes and motivation are seen entirely in terms of figures for attendance or for school exclusions. Researchers are positively discouraged from engaging in the democratic debate about what we want out of our education system, about our concept of childrens' welfare that is implicit in educational provision. The question 'effective for what?' is excluded from the debate.

The 'school effectiveness' paradigm is based on the assumption of progress towards greater predictability and control, the fine tuning of the system to produce optimum performance. I am sure that in addressing a specialist group of complexity theorists, I do not need to show how this whole perspective is undermined by complexity theory (see Radford 2008). Complexity theory denies us the kinds of predictability and control that are necessary to the school effectiveness paradigm. Although Complexity theory tells us that systems are self organising, this organisation is not one that even ensures the survival of the system, let alone one that sees it as gradually improving in its efficiency. Self organisation is just as likely to carry the school into decline as well as success. In social systems we find clear illustrations of 'lock in', in which they may be seen to go into a spiral of decline or ascent irrespective of management interventions.

This brings us to the question of the function of research and the reinstatement of curiosity. Complexity theory would suggest that education cannot be researched as if it were a bounded system with clearly identifiable functioning variables and regular linear interactions between them. It cannot be assumed that research will produce prediction and increased control, at least not in the way that the school effectiveness paradigm suggests. So what kinds of research are appropriate to educational systems and what can research do for managers and practitioners within them?

In general terms, complexity theory, it might be argued supports a trend back from the developmental to the theoretical. If systems cannot be characterised in terms of predictability and control that is assumed in developmental research, then it may be that we need to look more carefully, to establish more sophisticated theoretical models that will guide our observations and generate better understandings of their mechanisms. There are among others, two entry

points for our research into complex systems. The one is the more scientific approach, that is to follow the example of meteorology and attempt to model the system and simulate its various trajectories. Unlike the multi level factor analysis associated with the school effectiveness paradigm where there is an assumption that all other factors, apart from the 'managed' ones stay equal, modelling of complex systems allows for free play within the system, for a multiplicity of factors to come out to play at the same time. The hope is that if the modelling of educational systems proves viable, we might get a better understanding of how complex systems organise themselves and if and how such phenomena as 'attractors', 'recursive symmetries' might play a part in this understanding.

A second and more readily available area for enquiry is to look at other arenas of complex activity where human beings already function more or less effectively. Such activities might include, for example, managing sports teams, or political, diplomatic or military activity. High level performers in these areas can rarely account for their success. The politician might talk about political instincts, the football manager about following hunches. However much we engage in pre-planning and attempts to draw up formulae, circumstances invariably interrupt our trajectory. As the proverb says, 'at the first sound of the cannon, the general's plans go out of the window'. Social workers and lawyers similarly have to work with complexity, with the management of multiple non linear and dynamic interacting variables. It may be that we need to study more closely how people work in these areas of activity, to identify the knowledge, understandings, dispositions, etc. that enable people to cope with complexity.

Another arena of complex activity is that of the arts. Artists, like politicians, can rarely account for their decisions in relation to their work. In this case we might research the processes that the artist employs and further, to research the art itself. Research in this context takes on a critical and evaluative dimension. The critic researcher in this instance is interested in the role of intention and how intentions are manifest in practice. The critic's role goes further insofar as she seeks to describe and explain the work of the artist within the given aesthetic and cultural climate within which it has been produced.

In education we need to look at the work of the manager and practitioner from the point of view of what we know about complex systems. Complexity theory becomes our theoretical framework for describing and explaining the knowledge,

understandings and dispositions that enable practitioners to function more or less competently in educational systems. Similarly we need to study educational processes themselves, to understand them in terms of explicit and implicit intentions and how they might be interpreted within their given educational and cultural context.

The point is that the school effectiveness paradigm is unsustainable. Education is not a homogenous and linear set of processes but rather a heterogenous site of complexity, open in terms of its cultural and social boundaries. It consists of multiple non linear and dynamic interacting elements, with emergent properties and characteristics that render it, like climate change and global economic systems, essentially unpredictable. Nor can we compartmentalise our understanding of education from questions about the context in which it occurs and what it is trying to achieve. As a result of this education becomes much more interesting again. It is no longer a matter of simply generating technical solutions to given problems but rather one of studying the way in which such problems unfold within the system. Complexity requires us to take a more holistic and over arching view, studying the nature of unpredictable outcomes of interactions within the system. We may not be drawn back to the 'grand narratives' that spoke of progressive understandings but there is a new kind of curiosity that is aroused by complexity. The concepts of 'attractor states', 'recursive symmetries' and 'lock in' give us new perceptual tools with which to analysis educational situations and events. Of course we need to be smart to research complexity but we also need to be curious.

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