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Systems approaches to managing sustainable development: experiences from developing supported open-learning.

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Abstract:

It is argued that a failure to consider ecological sustainability within a systemic framework constrains the design of learning systems which are needed for taking effective purposeful action for 'managing' sustainable development. The arguments put forward are grounded in the author's experience of developing supported open learning curricula delivered in a distance teaching mode in the area of systems practice for managing complexity as well as the supervision of post-graduate student research.

Se argumenta que la falta de consideración de la sostenibilidad ecológica, dentro de un marco sistémico, trae consigo una limitación en el diseño de los sistemas de enseñanza necesarios para emprender acciones con sentido en el ámbito de la 'administración' de un desarrollo sostenible. Los argumentos aducidos se basan en la experiencia del autor en el desarrollo de sistemas abiertos de enseñanza en la modalidad a distancia, en el área de prácticas de sistemas para administrar la complejidad, al igual que en la supervisión de las investigaciones realizadas por estudiantes de posgrado.

Key Words: learning systems; ecological sustainability; systems approaches.

Introduction

This session to which I have been invited to contribute is devoted to ecological sustainability. My concern in this short paper is to situate the notion of ecological sustainability within a systemic context. I will argue that a failure to consider ecological sustainability within a systemic framework constrains the design of learning systems which are, from my perspective, needed for taking effective purposeful action for 'managing' sustainable development. My claims do not deny the significance of the concept of 'ecological sustainability', nor do they deny the desire on my part to privilege the concept in our conversations about a future. My concern however is with a future in which human beings are a part. Given the self-organising and evolutionary characteristics of ecological processes the world of our future must unfold from our present but ecological sustainability *sensu stricto* does not depend on the presence of human beings. From an anthropomorphic perspective, focusing only on ecological sustainability runs the risk of concealing the nature of our contemporary dilemma - that is, a crisis in our *relationships* with our biophysical environment and with each other.

My concern with these issues does not come from detached theorizing but is grounded in my experience of developing supported open learning curricula in the area of systems practice for managing complexity as well as the supervision of post-graduate student research.

Situating ecological sustainability in a systemic context

There is a need for new ways of social learning to address some of the sustainable development issues that many experience as complex (see LEARN 2000; SLIM 2000). Systems thinking in the hands of an aware systems practitioner has, in my view, a greater contribution to make than has hitherto been the case. It is for this reason, for instance, that the US President's Council on Sustainable Development (1996) education panel concluded that:

... education for sustainability is the continual refinement of the knowledge and skills that lead to informed citizenry that is committed to responsible individuals

and collaborative actions that will result in an ecologically sound, economically prosperous, and equitable society for present and future generations'. The principles underlying education for sustainable development include, but are not limited to, strong core academics, understanding the relationships between disciplines, systems thinking, lifelong learning, hands-on experiential learning, community-based learning, technology, partnerships, family involvement, and personal responsibility.

In my experience much of what is written about sustainable development can only be grounded when individuals are asked to outline their own stake-holding. This is what some of our teaching in recent courses sets out to do. Sustainable development can be conceptualised and depicted in many ways. If however it is considered as a purposeful human activity then it should be possible to model it (conceptually at least) in an activity diagram (Open University 2000). Many static depictions suggest sustainable development as the area of overlap between purposeful action that is ecologically sustainable, socially desirable and economically viable. To this can be added the notions of: 'technical feasibility', 'political legitimacy' and 'institutional capacity' (e.g. IIED 1996).

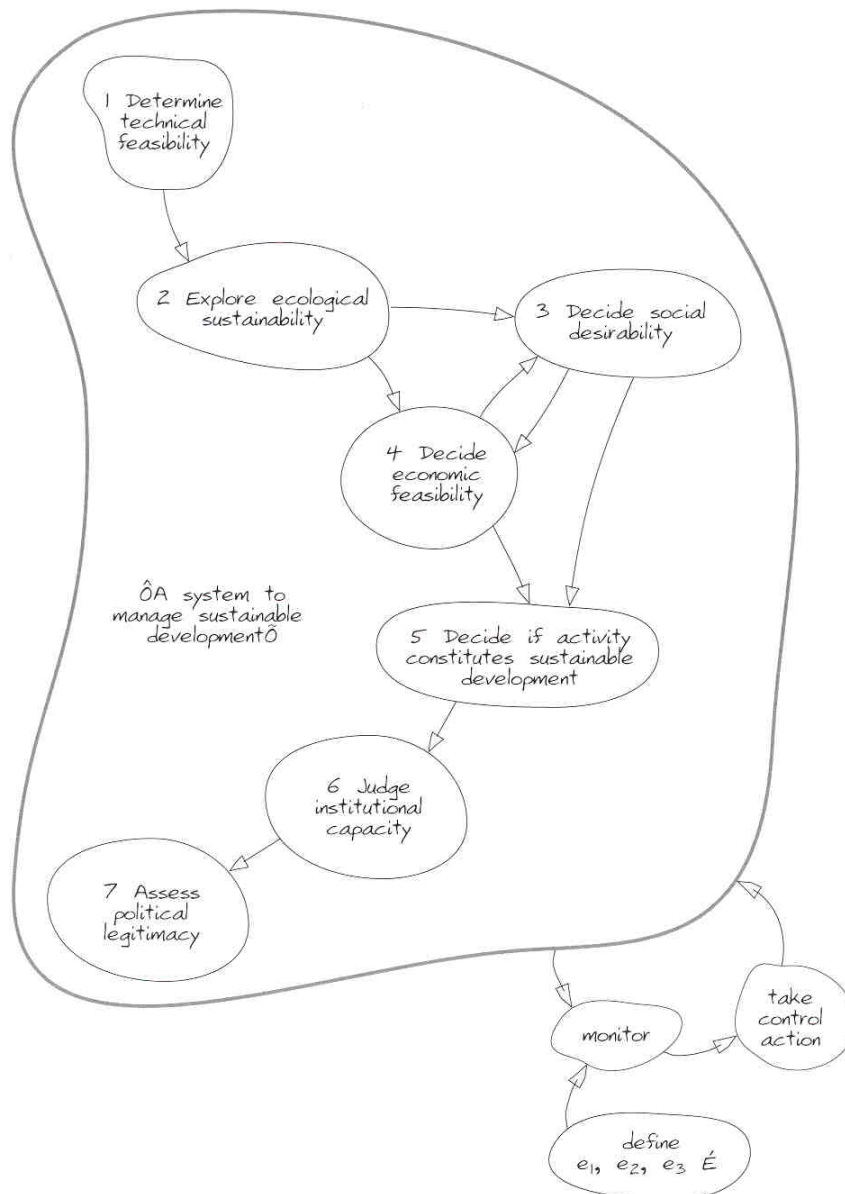


Figure 1. An activity model of a system to manage sustainable development (Source: from Blackmore et al 1999).

In Soft Systems Methodology (Checkland and Scholes 1999) for example, the completion of the mnemonic CATWOE (Clients; Actors; Transformation; Worldview; Owner; Environment) forces articulation of a worldview for any particular conceptual model. The act of discussing this in a group situation can surface personal values and enable the articulation of systems of interest designed to learn new ways to engage in purposeful action in which different stakeholder interests are

accommodated. The general process of developing a *root definition*, a concise description of a potential system of interest is (Checkland 1999):

- Do P by Q in order to contribute to achieving R (what to do, P; how to do it, Q; and why do it, R)

Figure 1 is an activity model of a 'system to manage sustainable development' which can potentially be used as a 'first-order' model starting point to explore what might be involved in managing sustainable development in any given context. The model includes the three E's (any model builder ought to decide what the criteria would be for these):

E₁ efficacy (does the means work?):

E₂ efficiency (amount of output divided by amount of resources used):

E₃ effectiveness (is the Transformation meeting the longer term aim?)

Let me try to explain what I mean by working through my own thinking as I developed this model (Figure 1). Initially I developed a systems map (a static representation) of a 'system to manage sustainable development' based on all the elements mentioned in the IIED example cited above. In doing this I found that all elements fitted within the boundary of my system of interest except 'ecological sustainability' which I put partially in and partially outside my boundary. My reason for doing this was because from my perspective some aspects of, or processes which contribute to, ecological sustainability are outside the scope of purposeful human activity. This seems to me to be an important and often neglected insight. For example, George Schöpflin (1998) in his Inaugural Professorial Lecture at the University of London claims that: "*The concrete, material world is less important than it was and we should look at the cognitive, symbolic, intellectual contexts of the facts, the data, the statistics on which we rely. We cannot do without such data, but we should begin from the presumption that data on their own tell us very little. If we don't follow this line of analysis we are unlikely to suffer humiliation and failure, but our reasoning will be more circumscribed and thus less effective.*"

Whilst I am sympathetic to this point of view it seems to me that this author has fallen into the trap, as many social and natural scientists do, of constructing a dualism of humans *and* nature rather than a duality of humans *with* nature.

In exploring my understanding of sustainable development I wanted to move beyond the static representation that a systems map affords and to explore the purposeful managing of sustainable development. I did this by developing an activity model (Figure 1). To develop my activity model I first thought about the *verbs* I wanted to associate with each of the triple bottom line activities. I decided on:

- (a) *explore* ecological sustainability;
- (b) *decide* social desirability;
- (c) *determine* economic viability.

I then decided what verbs were associated with the other terms:

- (a) *determine* technical feasibility;
- (b) *assess* political legitimacy;
- (c) *judge* institutional capacity.

Having allocated verbs that I was relatively happy with, I thought about which activities could be done at once. I discovered that this was not a straightforward decision in this issue-based activity model that I was trying to build (Checkland 1999). I realised that my answer to this question would depend on the specific context in which I was attempting to operationalise my ‘system to manage sustainable development’. I also became aware that an important sub-system in each of my activities would be, for example, ‘decide criteria for ecological sustainability’ (as I did this I also became aware of lots of other activities that would be needed in this process).

Figure 1 is the outcome of iteration between several models as I learnt my way to an appreciation of some of the issues involved. For example when attempting to unpack the logical sequence of activities for my system of interest I decided, given my background in technology development for grassland management, that I would start with ‘determine technical feasibility’ – this is something I know how to do in my context. In fact I would argue that it is where most technologists and applied scientists start doing what they do (an example might be to introduce new exotic species into a country for soil erosion control, or it might be to introduce a carbon tax

into a country's financial system). Having decided this, I remembered that in my experience, many researchers only determine technical feasibility and do not go beyond this activity, so I felt I was heading in the direction I thought was necessary. As I worked through the original six activities to build my first model I learnt that I needed an activity which decided whether any innovation, project, etc. constituted sustainable development (I imagined that as I expanded this activity into its sub-systems that it would involve making trade-offs and judgements against some criteria through some process etc.). I also found myself asking whether inclusion of this activity was valid (to me) or whether sustainable development was an output of the system, an emergent process of enacting such a system? This raises some interesting questions which are worthy of further exploration. I also found myself asking whether, because of my particular experience, I was being naïve about the activity of 'assess political legitimacy', and that on reflection I might place it nearer to activities 3 and 4 because what is socially desirable or economically feasible is contingent on what is politically legitimate in a given context.

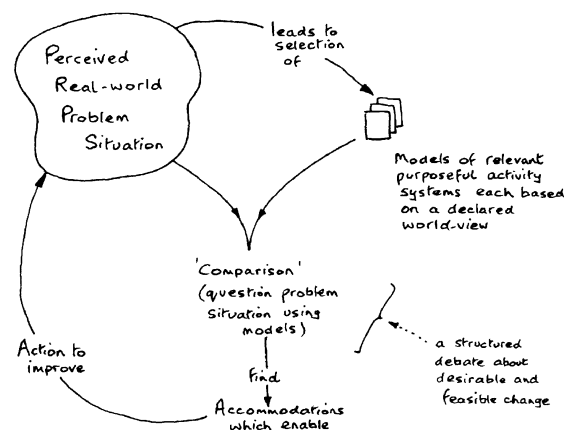
The other insight I gained is that even though I did not set out to do so, the process of doing the activity resulted in me asserting the precedence of 'explore ecological sustainability' in the activity sequence. This reflects my concerns with the nature of the relationships between people and their bio-physical environments, some of which appear to be relatively non-negotiable. Originally I used the verb 'determine' ecological sustainability but decided that a deterministic answer to this question was beyond any fully objective reach, and thus any final answer to what was regarded as ecological sustainability would have to be judged by concerned stakeholders. This partially contradicts the position I had originally arrived at with my systems map regarding purposefulness. It draws me, and students, into engaging with paradox and the realisation that all we have are choices of our own making including the capacity to plan for, or respond to surprise and contingency.

Designing learning systems for purposeful action

The example above demonstrates how systems thinking (in this case based on SSM) can be used to design a process in which the learning outcomes cannot be totally

specified in advance, but are an emergent property of the interactions of those who are involved. An aware systems practitioner using SSM as their systems approach does not specify the objectives in advance nor specify what the learning outcomes will be. They do however, if they are using SSM as methodology, carry a commitment to articulating in advance of their involvement, the intellectual framework they are using, and to reflect on their own learning about the situation and the process of inquiry.

SSM is now regarded by those who developed it as an organized 'learning system'. It is concerned with taking purposeful action in human activity situations that are experienced as 'very complex, problematical, mysterious' (Checkland, 1999, p. A10). What is constantly emphasized is that the word 'system' is no longer applied to the world, but instead to the process of inquiry for dealing with the world which, it is assumed, can be organized as a learning system. The activity sequence model which is used to describe this late 1990's version of SSM is shown in Figure 2.



Principles

- real world: a complexity of relationships
- relationships explored via models of purposeful activity based on explicit world-views
- inquiry structured by questioning perceived situation using the models as a source of questions
- 'action to improve' based on finding accommodations (versions of the situation which conflicting interests can live with)
- inquiry in principle never-ending; best conducted with wide range of interested parties; give the process away to people in the situation

Figure 2. An activity sequence model of the inquiring/learning cycle of SSM in the late 1990s. (Source: Checkland 1999, p. A9).

For Checkland, Figure 2 is a model of a learning system. Anyone participating in the activities described by the model in Figure 2 would be participating in an inquiring or learning process. If they participated for one or more iterations they would be described as completing an inquiring or learning cycle. It is only possible for a claim to be made that an SSM 'learning system' has been experienced through participation in the cycle of activities in which the thinking and techniques of SSM are enacted. An implication of this logic is that a 'learning system' can only ever be said to exist after its enactment - that is on reflection. It is of course possible to refer to a model of a 'learning system' at any time recognizing that it just that – a model.

Asking the question: 'who learns?' can be a powerful mechanism to guide and reflect on practice. But of course everyone learns all of the time – otherwise we would have lost one of the main characteristics of being human. So when I speak of a 'learning system' then I mean conceptualising a system in which a particular type of learning takes place, and which may not have happened if participants had not been engaged in the process. This is not the main way we think about learning in our society (e.g. Ison et al 2000). For example, many might conceptualise the curriculum that you studied at school as a learning system. With research, it may be possible to identify people who were responsible for its design. However, in my experience very few curricula have the systemic properties with which I am concerned. Too often curricula are systematic designs in which educators often specify learning outcomes in advance which are then implemented uncritically. However, with good practice such learning outcomes become guidelines to design and process, not mere objectives to be met. They leave room for the experience of the learner, for contextualisation and for emergent, sometimes surprising, outcomes.

My concern for the design of process for emergent outcomes comes from my engagement with systems thinking. Systems thinking is a way of orchestrating particular conversations concerned with the properties of a whole (distinguished by one or more observers) and particularly the nature and qualities of relationships between system components and a system's environment. The word orchestra comes from the Greek – to dance. Orchestrating means to combine harmoniously, carefully direct or co-ordinate. Conversation comes from the Latin, *con versare* – meaning 'to

turn together'. Thus for me, systems practice is practice in which the result from communication (as conversation) is the emergence of new qualities in the communicating or participating partners (see Blackmore et al 2000).

Systems Practice - the Open University pedagogical model

Over the 30 years of our practice as systems educators at the OU a discernible pedagogical model has evolved. Four explicit strategies are recognisable (Ison 2000):

1. Academics learned quite early that systems concepts need to be grounded as much as possible in the student's own experience. For this reason both continuous and examination assessment asks students to relate the systems thinking and practice in the courses to their own professional and personal contexts. We are aided in this strategy by the fact that most students are working whilst they study and they have a sufficiently rich life experience for the ideas to become meaningful.
 2. Case studies of failure (e.g. IT innovations; the UK Child Support Agency etc) have proven to be a way of engaging students' involvement beyond their own experience. This was a lesson which was learned very early and which continues to be employed.
 3. Diagramming (and other modelling) skills are developed and used as a means for students to engage with perceived complexity;
 4. Other systems concepts, tools, methods, and methodological approaches are taught so as to develop skills in '*formulating systems of interest.....for purposeful action*'.
- It is worth noting that in recent courses we have increasingly emphasised that purposeful action has both rational and emotional elements.

In the third level course presented for the first time in 2000 (Managing Complexity. A Systems Approach - T306) the metaphor of the systems practitioner as juggler is introduced to explicate ideas about systems practice. The case is made that an effective practitioner has to continuously think about, and act to maintain, four elements (the four balls in the air); the processes of Being a practitioner, the situation being Engaged with, putting the approach taken into Context and Managing in the situation. For example any attempts to purposefully manage sustainable development will require engaging with situations characterised by multiple-stakeholders (Ison et al

1997). If progress is to be made then it will often be necessary to bring the many stakeholders in a situation together in processes that formulate common systems of interest. This process, in the hands of an aware practitioner, is the same process as enacting a learning system.

Concluding comment

On the basis of my research experience in the design of participatory processes (e.g. see Ison and Russell 2000), I have become aware of what can be achieved by enthusiastic and committed individuals and groups in the face of what might originally have been perceived as overwhelming complexity, or scale. The motivation for such action is usually driven by particular experiences which give rise to enthusiasm. The learning systems approach is based on the design of experiential processes in which those who participate learn and change and have the chance to respond in non-deterministic ways. This can be aided by very powerful changes in organizing metaphors which affect whole societies. For example, the fundamental shift in thinking caused by the spaceships sending back pictures of the earth gave rise to the spaceship earth metaphor. It is this kind of change in thinking that leads to changes in action as exemplified by Gaia theory.

I would argue that many of the techniques and methods that are introduced in our recent courses have the potential to surface different value positions and to bring values into conversations in ways that are not typical of public decision-making processes. Second - order change, change which makes a difference rather than first-order change (more of the same) would seem to me to be a prerequisite for embracing systemically the activities associated with sustainable development (Figure 1; Ison and Russell 2000). Second-order change is not easy as most people know; important though it is, consideration of ecological sustainability in isolation is likely to commit us to a path of first order change.

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