Thinking Differently About Sustainability: Experiences from the UK Open University

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Abstract

Systems thinking is often invoked as a panacea for dealing with issues of sustainable development. Imperatives towards being more holistic—getting the bigger picture—are often coupled with a need for greater interdisciplinarity—joined-up-thinking—particularly amongst triple bottom line disciplines of economics, social studies and natural sciences. So why are systems thinking courses not more prevalent? And how might the teaching of systems thinking enhance the value of thinking differently about sustainable development? The Open University, UK, is a recognised international leader in the provision of Systems education for over 40 years. More recent experiences with the launch of a postgraduate Systems Thinking in Practice suite of qualifications at Certificate, Diploma, and Masters level, suggest an appetite for systems thinking amongst mature-age part-time students from a variety of professional backgrounds with an interest in learning for sustainability. This paper outlines three key features of the two core modules of the programme—epistemic understanding, active pedagogy, and design praxis. Significantly, these attributes have helped to complement rather than replace existing skill-sets amongst professionals from different sectors working in the field of sustainable development.

Keywords

Learning for sustainability · Systems thinking in practice · Systems thinking for sustainability · Epistemic understanding · Active pedagogy · Design praxis

This paper builds on two previous papers each dealing with one of the two Open University modules (OU codes TU811 and TU812) covered together here; one published by Reynolds (2011) relating to TU811, and another published by Ison and Blackmore (2014) relating to TU812.

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1 Introduction: 'Wacky' Systems Thinking for Sustainability

Whilst 'systems thinking' skills may have gained currency in discourse on sustainable development, rarely is the term used in further education beyond invoking the need for more holistic 'joined-up-thinking' and 'whole systems' design (e.g., Cortese 2003; Holman 2009). Attempts made at Higher Education Institute (HEI) level to explore the implications of systems thinking beyond thinking holistically can instead be regarded as unconventional. For example, one journalist writing for a UK-based national newspaper, referred to the *Systems Thinking in Practice* (STiP) programme at The Open University in the UK (OU) as constituting one of the more constructive but 'wacky' sources of postgraduate subject matter (Finn 2013).[1]

This paper reports on the STiP programme referred to by Finn in her article. The set of postgraduate STiP qualifications at Certificate (60 credits), Diploma (120 credits) and Masters (180 credits) level which began in 2010 has two main foci manifest through two core modules each commanding 30 credits: *Thinking strategically: systems tools for managing change* (OU module code TU811) and *Managing systemic change: inquiry, action and interaction* (OU module code TU812).[2] As well as being core to the STiP programme, the two modules provide elective options for other postgraduate programmes including environmental management, technology management, international development, amongst others. The two modules have been developed to build praxis capability in relation to complex issues that confront mature-age students in their professional and personal lives using the internationally recognized OU supported-open learning approach. Each module is studied part-time over a 6-month period, requiring a commitment of approximately 10-hour study a week. STiP students have a wide array of professional interests associated with managing complex situations, ranging from commissioning nuclear plants to public health administration to international development and gender-sensitive interventions.

Table 1 and Table 2 provide data on STiP student registrations and student origins, retrieved through an internal review of the two modules (see Ison and Blackmore 2014 for further details)

Some evidence of STiP impact to date can be seen through sales figures for the set of four co-published books produced by the Open University with Springer (UK) for use in the STiP programme (Table 3).

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[1] In a national UK newspaper article entitled *A World of Wacky Subjects* the journalist, Widget Finn, in a review of several UK University programmes included the postgraduate programme Systems Thinking in Practice as a particular exemplar of what she describes as "how to think with the Open University" (Finn 2013, p. 6).

[2] Until recently The Open University referred to the modules that form a degree qualification as courses. Nomenclature is now becoming more in line with other UK universities, and courses are often now referred to as 'modules'. Many OU students though still regard individual modules which they undertake, including TU811 and TU812 referred to in this paper, as stand-alone courses. They may not wish to necessarily fulfil a complete formalised qualification (such as, for example, a postgraduate certificate comprising of two 30 credit modules).

Table 1 Data on students registering on STiP core module presentations (TU811 and TU 812) 2010–2014

Year	TU811	TU812	Total
2010	91	107	198
2011	134	83	217
2012	111	78	189
2013	110	97	207
2014	**102**	not available	102
Total	548	365	913

TU812 starts in November so total registration numbers at time of going to Press were not available. Note also that since historically registration at the OU is module, not award based, data applying to each module do not necessarily apply to the same students

Table 2 Core STiP module student origins 2011–2012

Module	Presentation	Non-UK (%)	EU(%)	Ireland(%)	Outside EU(%)
TU811	2011	31	18	3	9
TU811	2012	28	11	5	12
TU812	2011	40	28	4	8
TU812	2012	18	15	n/a	1

Table 3 Book sales (includes print sales, MyCopy sales, bulk sales and individual eBook sales—as of April 2013) and chapter downloads Jun 06, 2010–March 2013 of the four co-published books

Title	2010	2011	2012	2013	Total	
	Chapters	Chapters	Chapters	Chapters	Books	Chapters
Systems thinkers (ST) (Ramage and Shipp 2009)	3,344	2,548	3,621	574	1,437	10,903
Systems approaches (SA) (Reynolds and Holwell 2010)	1,101	1,171	1,499	424	1,022	4,195
Systems practice (SP) (Ison 2010)	346	439	582	107	477	1,474
Social learning systems (SLS) (Blackmore 2010)	969	1,281	1,451	406	465	4,107
Total	5,760	5,429	6,753	1,511	3,401	20,679

This paper first outlines some of the key challenges associated with conventional teaching of systems thinking at HE level in supporting learning for sustainability. Three particular challenges to learning are identified—epistemic learning, social learning, and systemic design learning. They provide the backdrop for three peculiar features of the STiP core modules; innovative features that take the pedagogy of systems thinking beyond merely holistic thinking about inter-

relationships. The paper goes on to describe briefly how these features are relevant to learning for sustainability and how they are expressed in each of the two core modules of the STiP programme. Some indicative further challenges ahead for mainstreaming systems thinking for sustainability are discussed in the final section **Taking stock: challenges of systems thinking for sustainability**.

Learning for sustainability has been characterised as comprising an understanding of complexity, an active engagement with conflicting beliefs and values, and the formulation of new values where "existing values are incompatible with the needs of a sustainability transition" (Henry 2009, p. 134). Such learning requires not only *understanding* disciplinary perspectives but the *practice* of interdisciplinarity (moving beyond 'understanding' content within disciplinary boundaries), and the *praxis* of transdisciplinarity (moving beyond the divide between theory and practice to the world of learning as action). A systems approach has long been identified at higher education level as helpful for supporting transdisciplinarity (for example, Jantsch 1970), a tradition that continues, (Sterling 2004; Blackmore and Ison 2012) albeit at the margins of HEIs. For mature-age students who may have considerable practical experience in different professions but lack formal academic training, three significant challenges in higher education appear to hinder systems thinking for sustainability: the entrenchment of existing disciplinary boundaries; pedagogic traditions that fail to engage learners' existing work experiences; and lastly, institutional assessment strategies based on summative as against more formative or developmental evaluation.

Despite espoused needs for interdisciplinarity, conventional higher education offerings on sustainability more often perpetuate disciplinary silos. The 2002 World Summit on Sustainable Development (WSSD) prompted a recommitment towards "a collective responsibility to advance and strengthen the interdependent and mutually reinforcing pillars of sustainable development—economic development, social development and environmental protection—at local, national and global level" (Hens and Nath 2005, p. 386). Such mainstream exhortations of the triple bottom line (cf. Elkington 1998) can be helpful in prompting attention beyond economic concerns and may also invite joined-up-thinking of the type conventionally understood in terms of systems thinking. But it can similarly also reify existing disciplinary boundaries and reify the economic as distinct from the social, rather than as a special form of the social.

Academic disciplines may themselves be regarded as bounded systems. Such an idea fits well with Thomas Kuhn's notion of 'paradigms' (cf. Kuhn 1962); areas of beliefs, assumptions and practices which are partially fixed in order to enable the ongoing pursuit of particular understandings and practices. Kuhn did not explicitly equate paradigms with disciplines, but as an historian he demonstrated how paradigms often have a survival or duration longer than perhaps required given the changes in context (including 'real world evidence' that counters the beliefs and assumptions underpinning a particular paradigm). In relating disciplines as bounded paradigms, the challenge is in moving from an understanding of disciplines as *fixed purposive* 'real-world bounded systems'—towards disciplines as more *transient purposeful* systems circumscribed by boundary judgements.

The (multi)disciplinary challenge mirrors that of a significant shift in systems thinking during the late twentieth century from what was termed 'hard systems thinking'—systems regarded as real world (reified) entities or objects as with common understandings of 'the' economic system, 'the' legal system, 'the' ecosystem, etc.—towards 'soft systems thinking'—systems as conceptual constructs useful for learning about and changing the real world (cf. Churchman 1971; Checkland 1978; Jackson 1982; Ulrich 1983). The challenge is in using 'systems' as an epistemological rather than a purely ontological tool. Prigogine (1989) provides a lens on epistemic learning in his discussion of "dissipative structures"; an alternative model of the dynamics of learning where each learner goes through a period of chaos, confusion and being overwhelmed by complexity before new conceptual information brings about a spontaneous restructuring of mental models at a higher level of complexity thereby allowing a learner to understand concepts that were formally opaque.

Systems thinking for sustainability requires an *epistemic understanding* in exploring 'systems' as conceptual heuristic constructs rather than ontological real-world entities; constructs for learning in a radical constructivist tradition of epistemology (cf. Von Glasersfeld 1995). Thinking for sustainability requires moving beyond understanding of disciplines as fixed entities—fixed systems. Salner (1986) found in her study of systems teaching in the US, that many people are not able to fully grasp relatively simple systemic concepts (such as non-linear processes, or self-reflexive structures). They will therefore not be able to rethink organizational dynamics in terms of "managing" complexity or systemic change without substantial alteration in the worldviews (their "applied" epistemology).

A second challenge is in the conventional HEI *modus operandi* of a presumed divide between theory (thinking) and action (doing); between understanding and practice. Robertson (1998) identified 'complexity skills' as being significantly missing in a study of HEIs in the UK—particularly abilities to manage ambiguity and connectivity and to be comfortable with provisionality (uncertainty) and emergence (unforeseen consequences). Assumptions that human and societal behaviour can be changed just through knowledge transfer is a common predisposition often associated as John Seddon exemplifies with a belief in 'command and control management' (Seddon 2003). Blackmore (2012) points out that practitioners who are dealing with issues of sustainability in a particular context are likely to have different perspectives and different values and that the process of bringing diverse perspectives together is often challenging and requiring particular attention to practice as well as understanding. Engaging with multiple perspectives invites attention to praxis—reflection on practice—and issues of social learning—the dynamic between understanding and practice (cf. Röling 2002). Systems, cybernetic and complexity research are historically connected in their concern for understanding communication and control, emergence, self-organization, feedback and connectivity. However, to enable innovative systems thinking for sustainability, it is helpful to distinguish between learning concepts abstracted from their context of origin, and their adaptation for potential use as part of what might be called an *active pedagogy*—part of praxis in the learner's own context/lifeworld (cf. Nagda et al. 2003).

The third challenge relates to the institutionalized structures of HEIs that are inimical to the teaching of systems thinking for sustainability. The general industry of HEI certification and validation of education attainment tends to be wedded to assessment strategies based on principles of summative evaluation. Students learning about sustainability, for example, are usually required to evaluate their learning through a post hoc reflection process that feeds into an exam or project with set externally generated criteria of competencies. David Robertson—the reviewer of HEI provision in UK (1998)—claimed later that there had been "no serious attempt to capture complexity skills in competency statements" noting that in any case "competency statements tend to over formalize things when they are still emerging" (Pers. Comm. Ison 2004).

Jantsch (1970) in a paper with great resonance today entitled "Inter- and Transdisciplinary University: a Systems Approach to Education and Innovation" commented on the dysfunctional organization of Universities that retained a misguided belief of an internal logic or ecology which remains unaffected from social innovation. He went on to claim that:

> [a] systems approach…would consider science, education and innovation, above all, as general instances of purposeful human activity, whose dynamic interactions have come to exert a dominant influence on the development of society and its environments. A new policy as well as new structures for the university may be expected to emerge…designed explicitly with a view toward their innate capability for flexible change in accordance with the dynamically evolving situation" (ibid, p. 406).

Jantsch viewed systems thinking in terms of providing purposeful design support. Such a view of *design praxis* chimes well with contemporary ideas of the need for HEIs to teach 'design thinking' for embedded creativity across higher education curriculum outside of specific 'design' courses (Lloyd 2013). It articulates with what Ison (2010) refers to as systems thinking constituting a design-turn. The design-turn shifts attention away from an institutionalized endeavor for the pursuit of 'truth' towards an approach rooted in traditions of philosophical pragmatism (for example, Charles Peirce, William James and John Dewey) for purposeful learning and reflection (cf. James 1943).[3]

The three issues—epistemic understanding, active pedagogy, and design praxis—represent particular challenges for systems learning for sustainability. They are challenges that both core modules in the STiP programme address as briefly illustrated in the following three sections. The core STiP modules—TU811 *Thinking strategically* (Open University 2010a) and TU812 *Managing systemic change* (Open University 2010b) (henceforth referred to by their OU course codes—TU811 and TU812 respectively)—are designed as stand-alone modules. They provide alternative though companion routes towards an understanding of systems thinking in practice—TU811 being more 'methods' orientated (typical first

[3] The title of Al Gore's award winning documentary 'Inconvenient Truths' is, arguably, perhaps counter-productive in this context.

attraction amongst technical-based students) and TU812 being more 'philosophy' orientated (typical first attraction amongst humanities-based students).

2 STiP and Epistemic Understanding: From Understanding to Practice

Both TU811 and TU812 draw on a rich tradition of constructivist systems thinking exemplified by a four book-set series co-published by Springer used as Readers for the two courses (Table 3). *Systems approaches to managing change: a practical guide* (Reynolds and Holwell 2010) is the core reader for TU811. Five systems approaches are covered in the Reader representing the crux of TU811. Each of the five core chapters were commissioned to experts by the STiP course team on the basis of recognised expertise with either originating and/or adapting the approach towards constructivist thinking:

1 *System dynamics* (author: John Morecroft): an approach to understanding non-linear behaviour of complex systems over time, using ideas on feedback loops, stocks and flows, and time delays that affect the behaviour of the entire system in focus.
2 *Viable systems model* (author: Patrick Hoverstadt): an approach to understanding the necessary and sufficient conditions for the viability of systems in order to keep an independent existence, using principles of recursion (whereby a viable system itself can be seen as either part of a wider system or constitutive of many viable systems), and Ashby's law of requisite variety (capacity to exhibit diversity)
3 *Strategic options development and analysis* (authors: Fran Ackermann and Colin Eden): an approach for revealing and actively shaping the mental models, or belief systems (mind maps, cognitive models) that people use to perceive, contextualize, simplify, and make sense of otherwise complex issues, using cognitive mapping.
4 *Soft Systems Methodology* (author: Peter Checkland): an approach to process modelling in the analysis of complex situations where there are divergent views about the definition of the problem - 'soft problems' (e.g. how to improve health services delivery, or what to do about homelessness amongst young people?).
5 *Critical systems heuristics* (authors: Werner Ulrich and Martin Reynolds): an approach providing both a philosophical foundation and a practical framework for critical systems thinking, using ideas of reflective practice and boundary critique.

TU812 in contrast has two core co-published readers. *Systems Practice: how to act in a climate-change world* (Ison 2010) is structured into four parts: Part 1 introduces the societal need to move towards a more systemic and adaptive governance against the backdrop of human-induced climate change; Part 2 unpacks

what is involved in systems practice by means of a juggler metaphor; Part 3 identifies the main factors that constrain the uptake of systems practice, introducing the notion of systemic inquiry; Part 4 critically examines how systems practice is, or might be, utilised at different levels. *Social Learning Systems and Communities of Practice* (Blackmore 2010) is a collection of classical and contemporary writings associated with learning and systemic change in different contexts, including key contributors to constructivist epistemology such as Sir Geoffrey Vickers, Richard Bawden and Etienne Wenger amongst others.

The fourth book—*Systems Thinkers* (Ramage and Shipp 2009)—presents a biographical history of the field of systems thinking by examining the life and work of thirty of its major thinkers. *Systems Thinkers* is used by both courses for secondary reference purposes.

Both modules introduce and use 'systems' as explicit conceptual models—epistemological devices rather than ontological realities. Both employ variations of an heuristic exemplifying the epistemic-turn required with employing systems. Figure 1 represents the TU811 heuristic in two formats; Fig. 1a is an introductory heuristic and Fig. 1b is a more elaborated version presented later in the module. The heuristic is presented to students as a metaphor of 'conversation' in two dimensions; first-order between systems ideas and situations, and a second-order conversation between practitioners about the situations of focus. Systems of interest are regarded as language tools for enabling good conversation about the improvement of situations.

The TU811 heuristic makes a clear distinction between three entities (situations, people, and ideas—including 'systems' as particular expressions of ideas) alongside three activities (*understanding* inter-relationships, *engaging* with multiple perspectives, and *reflecting* on boundary judgements). TU811 offers two parallel streams of learning—the primary Tools stream and a secondary People stream. The Tools stream is where practical knowledge and competence is gained in experimenting with systems tools from the five systems approaches illustrated in the primary reader. The People stream provides a complementary awareness of how such practice is shaped by the often idiosyncratic ways people think and interact. The People stream is wholly online because it makes use of multimedia and interactive possibilities appropriate for an experiential, multiperspective approach to understanding the complexity of human thinking and communication. The two streams run through all parts of the module. The People stream can be regarded as providing a second order epistemic reflection, helping to place systems ideas themselves in a wider intellectual context, enabling appreciation of how interpersonal differences are likely to affect how 'tools' are used.

Figure 2 represents the TU812 heuristic. Like the TU811 heuristic, there is a clear though dynamic 'conversation' between the domain of ideas and situations. A second-order epistemic reflection is signaled here by the explicit representation of (systems) thinking about (systems) thinking.

The key feature here is in the practitioner using an embodied framework of ideas and method as part of a 'systems thinking' process separate from the 'situation'. Systems are not explicitly referred to in the heuristic though 'frameworks' and

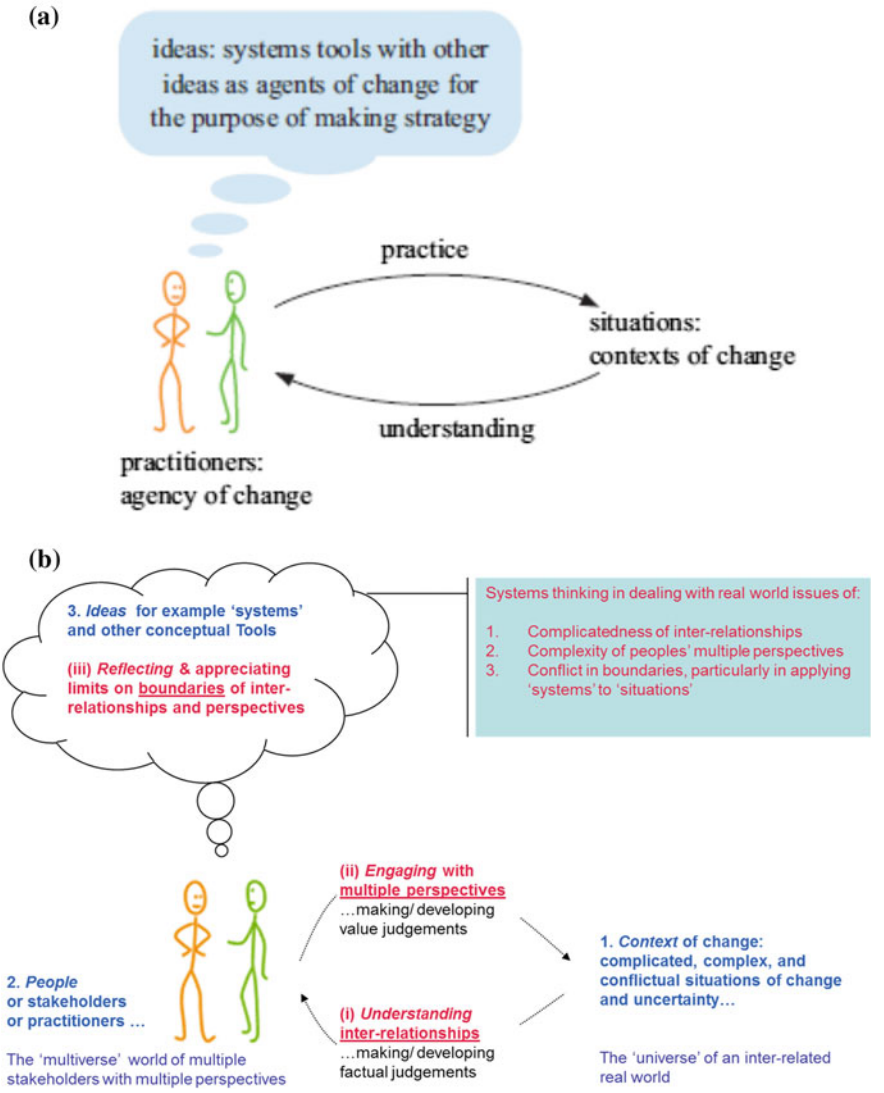

Fig. 1 TU811 systems thinking in practice heuristic for strategy making: two levels of resolution. **a** Low resolution heuristic (Open University 2010a, p. 20). **b** High level resolution heuristic (Reynolds 2013)

'methods' can be conceived as 'systems' in the first-order conversation, and the idea of a conceptual model itself can be regarded as a system in the second-order reflective conversation.

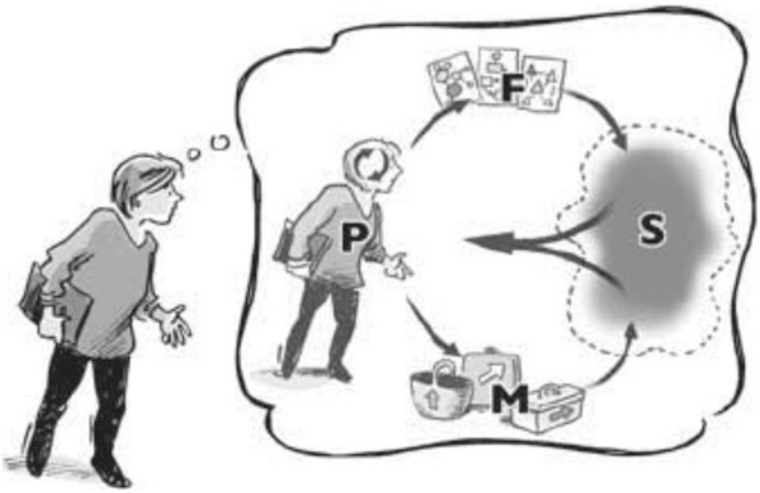

Fig. 2 TU812. A conceptual model or heuristic which can be applied to many forms of practice—comprising a person thinking about a real world situation a practitioner (*P*) engaging with a situation (*S*) with a framework of ideas (*F*) and a method (*M*) (adapted from Open University 2010b, p. 37)

3 STiP and Active Pedagogy: From Practice to Praxis

Systems teaching began at the OU in 1971 with the appointment of John Beishon as the first Systems Professor and the development of the undergraduate course T241—Systems Behaviour. This and subsequent systems courses built on the distance learning model at the OU known as supported-open learning. The aim from the beginning was to enable students to use their own context for learning in creative combination with tutors and course designers; part of what the OU calls active pedagogy—a part of praxis involving the learner's own lifeworld (Maiteny and Ison 2000). STiP core modules ensure that systems learning is grounded in students own work context.

Both courses require a number of activities to be undertaken using students' own context as a backdrop reference for learning. In addition there is a more formal assessment strategy which explicitly invokes the students' work experience; divided equally in weighting for each course between (i) continuous assessment consisting of three tutor-marked assignments (TMAs) and (ii) an end-of-module assessment (EMA) in the form of a project.

Figure 3 provides a model of the active pedagogy used to guide TU811 students in terms of a 'system for making strategy'.

Three distinct levels of student context are introduced at the outset, and central to the pedagogy of TU811: (i) *Area of practice* (AoP) - a high level domain of loosely defined professional or personal interest which individual students choose to use for

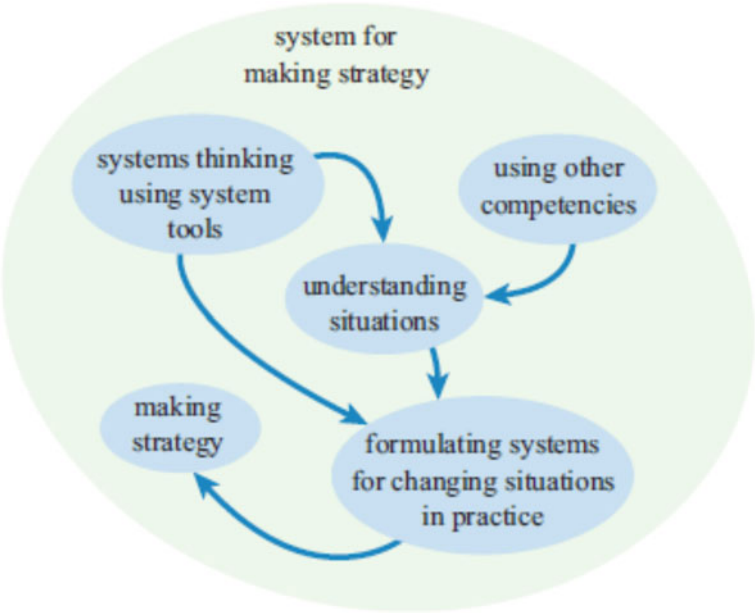

Fig. 3 TU811 simple conceptual model of strategy making (Open University 2010a, p. 20)

activities and assessments throughout the course; (ii) *Situations of interest*—a range of specific situations within a declared broad AoP that would benefit from 'strategic thinking', with different contemporary 'situations' chosen for each TMA; and (iii) *Systems of interest*—acting as proxies to perspectives regarding a 'system to do something' within any particular situation of interest.

Students are asked to choose situations of interest to explore within their AoPs as the experimental ground for practicing tools and techniques from each of the five systems approaches. They do this through Activities in the module Study Guide, Tutor Marked Assignments which constitute the continuous assessment (TMAs) and the end of module assessment (EMA). In the latter assessment work systems of interest are explored both as a proxy to perspectives (analytical mode) and as constructive devices (design mode)—strategic plans—for transforming the situations in the AoP in which they work.

TU812 draws on Wenger's social theory of learning (Wenger 1998), elaborated in his work on Communities of Practice (CoPs). For Wenger, social learning is about learning in a social context. Learning can be viewed as a journey through landscapes of practices (LoPs).

> "As learning gives rise to a multiplicity of interrelated practices, it shapes the human world as a complex landscape of practices. Each community is engaged in the production of its own practice—in relation to the whole system, of course, but also through its own local negotiation of meaning. This process is therefore inherently diverse." (Wenger in Blackmore 2010, p. 140)

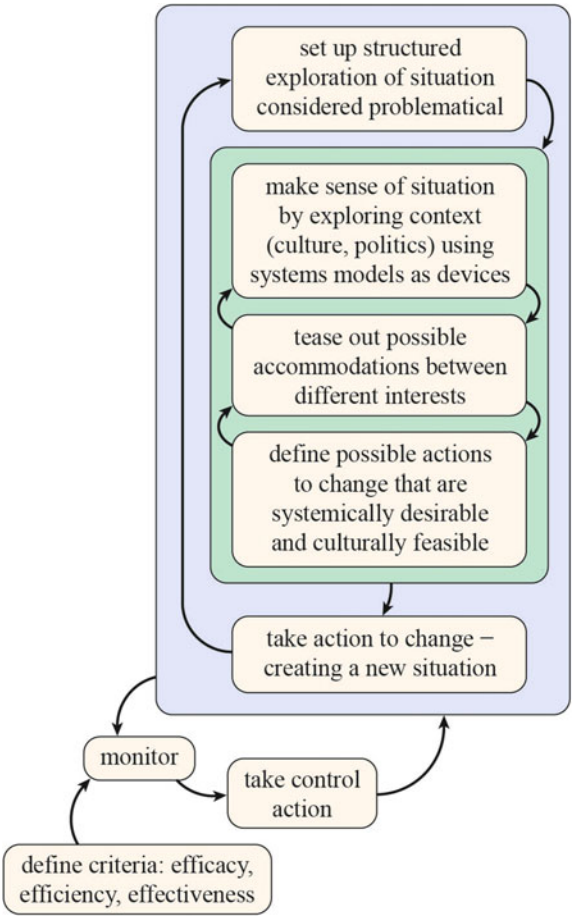

Fig. 4 TU812. An activity model of a system to conduct a systemic inquiry based on the work of Peter Checkland (Open University 2010b, p. 61)

In a similar mode to TU811, TU812 students use the ideas of CoPs and LoPs in relation to situations of their own choice. Figure 4 provides a model of the active pedagogy used to guide TU812 students in terms of a systemic inquiry for 'managing systemic change'.

The three core activities in the model and the TU812 pathway starts with the practitioner and their situation (Part 1), expands to include the dynamics of practitioner, situation, frameworks and methods (Part 2) and then expands to include material that develops skills and understanding and interaction through social learning and communities of practice to make transformations (Part 3). The model recognises that as more stakeholders become involved the complexity expands as do the demands for practice involving interaction of some form with others (stakeholders, clients, employees, employers etc.).

The LoPs concept enables students to review their own future learning trajectories by helping them review their multi-membership of communities, and recognise the multiple levels of scale with which they identified. LoPs generally provide students with a potential way of considering what they perceive beyond the communities and practices with which they most identified from their own experience. Students found particularly inspiring Wenger's suggestion that

> …we each have a unique trajectory through the landscape of practices. This trajectory has created a unique point of view, a location with specific possibilities for enhancing the learning capability of our sphere of participation. From this perspective, our identity, and the unique perspective it carries is our gift to the world (Wenger in Blackmore 2012, p. 197).

Iterative use of a 'learning contract' in successive TMAs for TU812 was designed to test if students can make the shift from a systematic to a systemic design of their own 'learning system'. This is more than a shift in representation, though this is also needed. The evolving learning contract forms the foundation for their engagement with the course concepts so that the students own learning needs and desires for situational transformation can be accommodated within the module context.

4 STiP and Design Praxis: Towards Pragmatic Reflexivity

Both modules are about reflexive practice or 'praxis'—a second-order practice involving reflection on reflection. Figure 5 illustrates first-order reflective practice as illustrated in TU811.

TU811 students are required to make several loops throughout their assessments using contemporary news items associated with their chosen area of practice. Part of the EMA, aside from the core project report, requires a further second-order reflection on their practice.

Figure 6 illustrates second-order, reflexive practice as depicted in TU812.

By using systems thinking in practice it is possible to appreciate potential changes in a situation of concern that are systemically desirable and, if managed appropriately, become culturally feasible. The strategic opportunity offered by STiP is that through this combination of processes, it is possible to alter the trajectory of change.

TU811 and TU812 require students to develop a project for their EMA using the systems concepts and other ideas introduced in the course in a constructive, reflexive, design-mode manner. The driver is one of formative rather than summative evaluation. For TU811, a significant point of departure from conventional teaching of systems approaches is the encouragement to play with different ideas and tools from different systems approaches as a way of escaping the reification and fetishisation of methods and methodologies. Rather than falling into the trap of a contingency approach—strict rules for designating particular methods for particular situations, TU811 students are allowed to choose whatever tools they feel

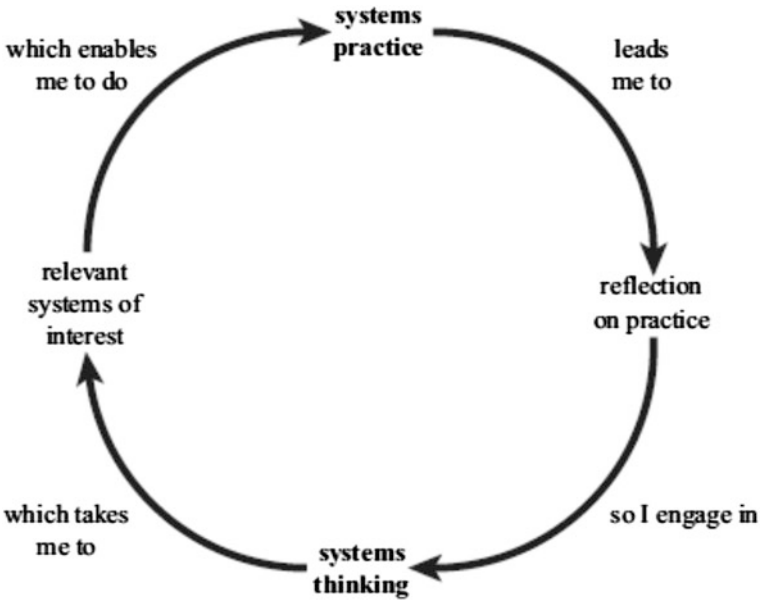

Fig. 5 TU811 the learning process as a virtuous cycle associated with reflective practice (*source* Open University 2010a, p. 21)

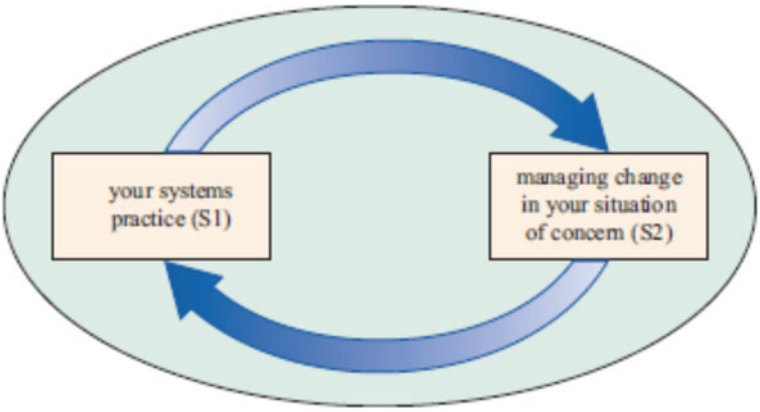

Fig. 6 A virtuous cycle of inquiry in which an appreciation of systems practice (*S1*) when enacted can contribute to managing change in a situation or situations of concern (*S2*) that is systemic, at the same time as deepening understanding and practice of systems practice (*S1*) which can be applied in new situations (*Sn*) (Open University 2010b, p. 58)

appropriate for their task in designing a strategy for their chosen final situation of interest, based on experimentation undertaken in earlier assignments. For TU812 all three TMAs again feed into the EMA which comprises the design of a 'briefing

paper' relating to systemic inquiry for managing and effecting purposeful systemic change. As with TU811, TU812 similarly has a reflexive component as well as core component (project report or briefing paper) to the final submission. The reflexive component enables students to demonstrate their second-order reflexivity.

5 Discussion: Moving Beyond 'Empty Management Talk'

A testimony from one of our alumni on the *Wacky subjects* newspaper article stated: "I was keen to learn about complex systems and how to use them, but didn't want empty management talk…." (Finn 2013, p. 6). The empty management talk referred to might have several manifestations in relation to conventional learning for sustainability. Firstly, the recurring call for multidisciplinarity coupled often with a promotion of multi-methods. The prevalence of multidisciplinary teams associated with sustainable development interventions signals a concern for inter-relationships between different substantive areas of knowledge. But it does not necessarily address the epistemic challenge of knowledge generation through interdisciplinary constructivism. Instead it may often serve to reify disciplinary boundaries with ontological assumptions of there being some objective 'economy', 'society' and 'natural environment' existing as 'systems' outside of our knowledge construction. From a STiP viewpoint, an epistemic-turn is required: systems are not real world ontologies, but rather epistemic constructs used to learn about and improve situations of uncertainty, complexity and conflict. Secondly, practitioners exploring and engaging with issues of sustainability as learners cannot be divorced from the reality of other stakeholder perspectives. From a STiP viewpoint, learning for sustainability requires a pragmatic-turn: active engagement and experimentation through continual interaction and feedback with other practitioners as co-learners including where possible colleagues in the workplace. Thirdly, and relating to the other two manifestations of conventional learning for sustainability, learners cannot be divorced from the situations that they are co-creating in the learning process. Conventions of what Ison (2010) calls a 'projectified world'—a world of project planning with orthodox practices of command and control mindsets (cf. Seddon, 2003)—often assume methods and tools to have some innate value for transformation (technical fix) outside of the users experiences as part of a learning process. Incidences of systemic failure or success are not other-worldly events but events to which acts of learning contribute. Ralph Stacey put this well in observing how managers adapt to uncertainty and complexity: "The changes occurred, not because [of the] planning, but because [of the] learning in a manner provoked by the very ambiguity and conflict [they] were trying to remove" (Stacey 1993). From a STiP viewpoint, a systemic design-turn is required. That is, systems used as heuristic devices not just for understanding systemic change and engaging systemically with other stakeholder perspectives, but for shaping the world through innovative, experimental modes of creative learning; systems learning for sustainability.

Several significant challenges remain in the teaching of STiP as a means of enhancing learning for sustainability. Despite considerable favourable feedback from a majority of STiP students undertaking the courses, some students feel alienated by the demands on epistemic reflection in the use of systems. An epistemic-turn is often discomforting particularly amongst students from positivist traditions of engineering and technology where 'systems' are taken as given realities.

A second challenge and source of alienation is in the demands on praxis and interaction. Many traditional part-time students are attracted to distance learning because of the 'independent learning' features offered by the OU. Whilst many take advantage of the vibrant online discussion forums and video-conferencing tutorial events offered in both courses, some choose not to engage actively or at best engage, albeit quite legitimately, as passive observers. (All online tutorials whilst offered at differing times are recorded.).

Perhaps the most pervasive challenge though is institutional—both in terms of HEI norms and practices and wider institutional norms and practices experienced by our students in their workplace. Conventional demands of summative assessment procedures at University level with associated embedded measures of performance associated with, say, the number of passes, can sometimes be slow to keep up with innovative designs around more formative developmental assessments in learning systems designed at the module/course level. But over the years we have also become aware that developing new ways of teaching may be insufficient to develop STiP competencies. Such competencies might only be sustained if the institutional structures and relationships where a learner is employed are not inimical to the further development and testing of systems ideas. In short, communities of practice established during the courses can be difficult to sustain after the course finishes unless there is purposeful innovation beyond the university. In our case an innovative response to this challenge is the emergence of a vibrant self-organising LinkedIn on-line community of nearly 600 STiP alumni. This has arisen through the ongoing desire of our students to 'walk the talk!'.

6 Conclusion

TU811 and TU812 are heuristic devices (Figs. 1 and 2), each designed by a team of Systems academics with a conscious and concerted need to break out of conventional 'management talk'. Both heuristics deal with all three misgivings of conventional learning for sustainability described above, but with different emphases. TU811 attends more to the context of change and the experimental adaptability of ideas and tools (epistemic understandings) for systems praxis. TU812 focuses more on the agents of change (active pedagogy) and the practitioners involved with social learning and communities of practice in systemic inquiry. Both modules share the same pivotal attention to issues of reflexive responsibility in creating improved situations of sustainability (design learning).

Alongside the success of the STiP programme, there remains a need to consider what characteristics are most likely to be needed for the design of learning systems with a high degree of connection between learner, tutor, course, work context, and academic management of the curriculum. A system capable of sustaining STiP competencies in learning for sustainability may require different structures and organization than is currently found in most formal and non-formal education and training settings. A systemic research inquiry to surface these concerns—concerns which often militate against emergence and self-organization—is currently under development at the OU involving the STiP authors, tutors, students, and employers (Open University 2014).

References

Blackmore C (ed) (2010) Social learning systems and communities of practice. Springer and The Open University, London and Milton Keynes

Blackmore C (2012) Sustainability. In: Chadwick R et al (eds) Encyclopedia of applied ethics, 2nd edn, vol 4. Elsevier, Oxford

Blackmore CP, Ison RL (2012) Designing and developing learning systems for managing systemic change in a climate change world. In Wals A, Corcoran PB (eds) Learning for sustainability in times of accelerating change. Wageningen Academic Publishers, Education and Sustainable Development Series, Wageningen, pp 347–364

Churchman CW (1971) The design of inquiring systems: basic concepts of systems and organizations. Basic Books, New York

Checkland P (1978) The origins and nature of 'hard' systems thinking. J Appl Syst Anal 5:99–110

Cortese AD (2003) The critical role of higher education in creating a sustainable future. Plan High Educ 31(3):15–22

Elkington J (1998) Cannibals with forks: the triple bottom line of 21st century business (conscientious commerce). New Society Publishers, Gabriola Island

Finn W (2013) A world of wacky subjects. The Independent (UK Newspaper: Post Graduate Supplement), 20th Nov 2013, pp 5–6

Holman P (2009) The change handbook: the definitive resource on today's best methods for engaging whole systems: Easyread Edition, ReadHowYouWant. com

Henry AD (2009) The challenge of learning tor sustainability: a prolegomenon to theory. Human Ecol Rev 16(2):131–140

Hens L, Nath B (2005) The world summit on sustainable development. Springer, New York

Ison R (2010) Systems practice: how to act in a climate-change world. Springer and The Open University, London and Milton Keynes

Ison R, Blackmore C (2014) Designing and developing a reflexive learning system for managing systemic change. Systems 2(2):119–136

Jackson M (1982) The nature of soft systems thinking: the work of Churchman, Ackoff and Checkland. J Appl Syst Anal 9:17–28

James W (1943) Pragmatism, a New name for some old ways of thinking: together with 4 related essays selected from: the meaning of truth. Longmans, Green & Company

Jantsch E (1970) Inter- and transdisciplinary university: a systems approach to education and innovation. Policy Sci 1(1):403–428

Kuhn T (1962) The structure of scientific revolutions. University of Chicago, Chicago

Lloyd P (2013) Embedded creativity: teaching design thinking via distance education. Int J Technol Des Educ 23(3):749–765

Maiteny P, Ison R (2000) Appreciating systems: critical reflections on the changing nature of systems as a discipline in a systems-learning society. Syst Practice Action Res 13(4):559–586

Nagda BA et al (2003) Transformative pedagogy for democracy and social justice. Race Ethn Educ 6(2):165–191
Open University (2010a) TU811 thinking strategically: systems tools for managing change (study guide). The Open University, Milton Keynes
Open University (2010b) TU812 managing systemic change: inquiry, action and interaction (study guide). The Open University, Milton Keynes
Open University (2014) Post-graduate student recruitment and retention: design criteria for a learning system based on community of practice building and employer engagement and eSTEeM project. The Open University. http://www.open.ac.uk/about/teaching-and-learning/esteem/projects/themes/other/post-graduate-student-recruitment-and-retention-design-criteria-learning-syste (accessed, 10th April 2014)
Prigogine I (1989) The philosophy of instability. Futures 21(4):396–400
Ramage M, Shipp K (2009) Systems thinkers. Springer and The Open University, London and Milton Keynes
Reynolds M (2011) Bells that still can ring: systems thinking in practice. moving forward with complexity. In: Tait A, Richardson KA (eds) Proceedings of the 1st international workshop on complex systems thinking and real world applications. Emergent Publications, Litchfield Park, pp 327–349
Reynolds M (2013) Managing systemic risk using systems thinking in practice. AWERProcedia Adv Appl Sci 1:217–224
Reynolds M, Holwell S (2010) Systems approaches to managing change: a practical guide. Springer and The Open University, London and Milton Keynes
Robertson D (1998) The emerging political economy of higher education. Stud High Educ 23 (2):221–228
Röling N (2002) Beyond the aggregation of individual preferences: moving from multiple to distributed cognition in resource dilemmas. In: Leeuwis C , Pyburn R (eds) Wheelbarrows full of frogs: social learning in rural resource management. Koninklijke Van Gorcum, Assen
Salner M (1986) Adult cognitive and epistemological development in systems education. Syst Res 3(4):225–232
Seddon J (2003) Freedom from command and control. Vanguard Education, Buckingham
Stacey R (1993) Strategy as order emerging from chaos. Long Range Plan 26(1):10–17
Sterling, S. (2004). Higher education, sustainability, and the role of systemic learning. Higher education and the challenge of sustainability, Springer: 49-70
Ulrich W (1983) Critical heuristics of social planning: a new approach to practical philosophy. Wiley, Stuttgart (paperback version)
Von Glasersfeld E (1995) A constructivist approach to teaching. Construct Educ 3:15
Wenger E (1998) Communities of practice. Cambridge University Press, Cambridge

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