There are many problems facing humanity at the start of the Twenty First Century. Some of these are declared in the United Nations Millennium Development Goals together with targets to be achieved if the problems are to be combated. At the United Nations University potential solutions to some of these problems are explored in an academic context by a wide variety of researchers. Here at the Institute of Advanced Studies we are particularly concerned about creating the conditions for Sustainable Development. As part of this goal the Education for Sustainable Development (EfSD) team looks at ways to, for example, form networks of educators disseminating Sustainable Development goals such as the current initiative to form Regional Centres of Expertise. The proposal in this editorial is that one possible method for delivering EfSD is to utilise Information Communications Technology (ICT) to facilitate Distance Learning. However, for ICT to work it is proposed that a more systemic, holistic approach needs to be adopted particularly in the light of multiple contexts and the new conditions present in the world today.

So, what exactly is systems thinking…?

“System. 1 a set of things working together as a mechanism or network. 2 a person’s body. 3 Computing. a group of related hardware units or programs or both. 4 an organized scheme or method. 5 orderliness. 6 the existing political or social order.”

The New Pocket Oxford Dictionary

Systems thinking has a long and varied history. It can be traced as far back as 2000 years ago when self-regulating machines were used to control the water levels in resevoirs. Then, later in the 18th Century more elaborate systems were required as humanity began to develop more challenging machinery such as windmills. Of course, with the subsequent development of the Steam Age thinking about systems advanced beyond simple mechanisms thus requiring the development of an associated mathematical language to model them. Also, during this time systems thinking was starting to be employed by Biologists as they grappled with understanding the complexities of, for instance, the human body. Around this time Eduard Pluger employed the term teleology to mean the study of final causes, that is, the observation of an apparent link between a system’s output and input allowing the output to control the degree of input.

All these efforts culminated in Norbet Weiner introducing the term cybernetics in 1948. This term is derived from the Greek meaning steersman and is concerned with the study of communication and control in regulatory feedback. At this point cybernetics began to
be used by such luminaries as Kenneth Craik who was concerned with human-machine interaction primarily applied to the study of tank and aircraft operators during the Second World War. He in fact noticed tendencies of steady-states or homeostasis in systems involving both humans and machines. Others were starting to apply cybernetic worldviews to the study of social systems such as their application in individual or family therapy. Indeed it was around this time that the notion of an open system was coined which might be one system’s place in a larger system, such as a family’s role in society.

A number of other researchers in the Fifties and Sixties were taking the system paradigm a stage further. Such people as W. Ross Ashby and Ludwig von Bertalanffy were proposing more generalised notions of systems. Von Bertalanffy in particular proposed a General System Theory consisting of a number of previous system methods such as cybernetics, game theory, information theory, etc. Von Bertalanffy, influenced by his work in Biology, became interested in discovering mathematical models which would be generally, holistically applicable to a variety of traditional disciplines such as physics and biology as well as behavioral and social sciences.

… and what does it have to do with Education for Sustainable Development?

So, what does all this abstract ‘system thinking’ have to do with Education for Sustainable Development? Well, a number of researchers are now starting to think of Information Communications Technology (ICT) and Education in particular in terms of systems. Of note is Liber’s application of Stafford Beer’s Viable System Model (VSM) published in the International Journal of Learning Technology in 2004 (Vol. 1, No. 1). Liber applies the VSM to model the complexity apparent at different levels of the management of education systems such as states, Higher Education (HE) institutions, departments, courses, etc. Each system consists of a separate management and operational subsystem where conflicts are mediated by policy. Importantly a result of this approach is that it becomes apparent that one system should not try to manage another although there needs to be rich communication channels between layers. This leads Liber to critique the current UK HE system due to a lack of these clear channels and omission of autonomy for ‘lower’ layers, such as student selection of timetables, concluding that as well as pedagogical and technological change new educational systems also require organisational change.

Pelgrum and Law in “ICT in education around the world: trends, problems and prospects”, published by UNESCO in 2003 also describe a systems model of education. Furthermore, their model also operates on distinct layers, notably education systems, schools and individuals. Each layer contains ‘policy and strategy’ and ‘implementation’ components. Exemplars for the education system layer include ‘policies and strategies’ of professional development and implementation plans and associated ‘implementations’ of curriculum goals, content and methods and assessment goals and methods. Similarly the other two layers are deconstructed to form an overall systemic blueprint for a complete education system. Importantly the performance of implementations for each of the three layers is monitored and evaluated then helps inform future revisions of the ‘policy and strategy’ layer. Law and Pelgrum then use their model to discuss, for instance, the role of
the curriculum upon the success of ICT and the effect of pedagogical philosophy, such as ‘student-centred’ upon policy and implementation strategies. Additionally, Law and Pelgrum stress the effect of ICT infrastructure upon the success or otherwise of ICT. Additionally they stress that staff development (in the widest sense such as teachers, technicians and ICT coordinators) is of paramount importance. They also state that organisational change is key, in-keeping with Liber, particularly in the light of Lifelong Learning. Finally, they discuss the effects of national policies upon their model.

Applying systems thinking to ICT-based learning.

This systems thinking is currently taking place as part of a Postdoctoral research program within the UNU-IAS which is examining ICT-based learning in multiple contexts within a broad interpretation of EfSD utilising a multi-method approach. The following five factors are seen as key from the outset. By examining cases from these perspectives the hope is to derive a systems model for EfSD with particular emphasis on its implementation in Developing Countries.

1. Socio-cultural – what particular social, cultural and ‘political’ factors must be considered in the design, implementation and evaluation of e-Learning?
2. Organisational – what organisational infrastructure is most appropriate to the success of e-Learning and how can a current structure be adapted if necessary?
3. Pedagogical – what existing pedagogies are employed in the educational context and how can existing pedagogical approaches to e-Learning be reconciled with other culture’s expectations?
4. Technological – what are the particular limiting (or indeed facilitating) technological factors which need to be considered in the design of e-Learning which will allow successful deployment?
5. Economic – what kind of economical factors stand in the way of the implementation of e-Learning particularly in Developing Countries?

Some of these issues are beginning to be addressed and doubtless others will reveal themselves. More importantly, it is hoped, that the systems way of thinking can aid other programs with the UNU, particularly in the EfSD programs. The hope is that the approach compliments existing traditional approaches such as the use of diplomacy for the establishment of networks like the Regional Centres of Expertise and hence provide a more rigorous and scientific basis for their formulation. Ultimately though no one system may provide all the answers so, in-keeping with a general system ethos, all possibilities should be considered if EfSD is to succeed.

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