

Assessing the Importance of Systems Thinking for Sustainability-Oriented Education

Marius Brazdauskas

Vilniaus kolegija / University of Applied Sciences,
Vilnius, Lithuania.

Abstract

Many researchers from a wide range of disciplines seek to assess and better understand the complexities of sustainability by arguing that in order to understand sustainability one requires to adopt a multidisciplinary systemic lens that takes into account the interconnection of economic, social, environmental and political issues. This paper aims to contribute to a relevant academic and scholar discussion on how to prepare students for systems thinking towards advancing sustainability by providing concrete guidelines for the curriculum. The author argues that the curriculum related to sustainable development and corporate social responsibility should highlight systems thinking towards solving sustainable development priorities. By presenting a theoretical systemic analysis and synthesis of scientific literature, this article follows an exploratory approach to assess the importance of systems thinking in developing curriculum for sustainability.

Keywords: sustainable development, sustainability, CSR, systems thinking

Introduction

Many researchers from a wide range of disciplines seek to assess and better understand the complexities of sustainability and corporate social responsibility (CSR) by arguing that in order to better understand sustainability and CSR one requires to adopt a multidisciplinary systemic lens that takes into account the interconnection of economic, social, environmental and political issues. Sustainability requires developing substantial student competences in order to tackle the complexity of sustainability field. In turn, the following competence guidelines are being proposed in order to educate students to be the sustainable and creative power of upcoming generation that forwards innovative and creative sustainable solutions into our reality (Brazdauskas, 2015):

- To promote student understanding of sustainability as multi-dimensional and multi-level concepts involving innovative and creative thinking;
- To promote innovative and multi-perspective solving skills that could potentially address sustainability-based issues;
- To promote student knowledge of the ecological and social problems facing local and global communities and recognize opportunities in this context;
- To promote student insight into sustainable development trends and knowledge on how to use them to their professional or entrepreneurial advantage;

- To promote student awareness on how local actions impact global situations and, in turn, how global challenges should be solved locally;
- To promote student understanding and competence on how to align business strategies with macro-level social and environmental priorities;
- To promote student personal responsibility by emphasizing that the starting point of change and behaviour is within personal motivation;
- To promote student self-directed continuous education in advancing sustainable business goals and the importance of life-long learning in order to be a frontrunner of innovative thinking and creative problem solving for sustainable development.

Some systems thinkers such as Ackoff view sustainability and CSR as actions that an organisation takes to address both in its own interests and the interests of wider society (Ackoff and Rovin, 2003). The literature review suggests that many scholars also view CSR from a systems perspective (Maon et al., 2008). Some research trajectories also emphasized the importance of systems thinking for CSR by highlighting that CSR is grounded upon understanding of multiple perspectives and relationships and that the field would benefit from the use of systems thinking and methods (Cordoba and Campbell, 2008).

Nevertheless, educating for sustainability requires a highly complex and systemic approach since sustainable development calls for finding solutions for complex, trans-disciplinary, multi-agent, and multi-factor problems. By promoting student systems thinking, higher education institutions may expect positive outcomes in the practices of future workforce. The purpose of this article is to contribute to the ongoing academic discussion on how to prepare students for sustainable development priorities and advance their competences and capabilities that promote sustainability in their professional practices. The author argues that the curriculum related to sustainable development and corporate social responsibility should highlight systems thinking towards solving sustainable development priorities. By presenting a theoretical systemic analysis and synthesis of scientific literature, this article follows an exploratory approach to assess the importance of systems thinking in developing curriculum.

Assessing the Complexity of Systems-Thinking

What is systems thinking? To answer this question, first of all, we have to define a system. There are a variety of definitions of a system and approaches towards it. Some authors define a system as a collection of things or activities which are interconnected and which can be regarded as a single whole entity that has a purpose and that can adapt and survive in a changing environment such that the purpose continues to be met (Lucket, 2004), as a whole, being consistent of interdependent elements (Kramer & De Smit, 1977), as a set of two or more related and interdependent elements (Ackoff, 1999), or even as a

way of looking at the world, which influences how people think about the world due to their different experiences (Weinberg, 1975). Indeed, many scholars tend to agree that a system is a number of interdependent components that form a whole and work together to attain a common goal (Senge, 2006; Midgley, 2000; Beerel, 2009; Maani and Cavana, 2007).

An important element of a systems thinking is the element of *interdependence* of its elements. Systems theorists have defined the critical characteristics of a system as being interdependent and interconnected (Jackson, 2001; Midgley, 2000, 2003). The literature review suggests that scholars across systems thinking domain tend to agree that a system is a number of interdependent components that form a whole and work together to attain a common goal (Senge, 2006; Midgley, 2000; Beerel, 2009; Maani & Cavana, 2007).

Another important element of a systems thinking is the element of contextuality. For instance, Capra (1996) believes that a system is an interrelated whole, whose essential properties arise from the relationships between its parts, whilst systems thinking is the understanding of the phenomenon within the context of a larger whole. In addition, Clark (2001) suggests that systems thinking reinforces the intuitive insight that no single, discrete entity can be fully understood apart from the complex whole of which it is an integral part. It could be further argued that systems thinking is contextual thinking because it recognizes that without a context, meaning is incomplete. This approach facilitates a better understanding of the relational implications over time though temporal and special dynamics.

Furthermore, systems come in the form of natural, technical and human forms. For instance, societies contain an almost infinite number of systems, most of which are interconnected or nested in the sense of a group being part of another system that is part of a national system that is in turn part of a regional or global enterprise. The human systems include families, groups, organisations, networks, partnerships, and all these human systems are webby, non-linear, entangled, wandering messes that do not lend themselves easily to traditional analysis and action (Morgan, 2005). Therefore, the element of complexity is inherent in systems-thinking.

Promoting Systems Thinking for Sustainability Education

One of the most complex tasks in sustainability education is the application of systems thinking which is fundamentally different from a traditional form of analysis. Traditional analysis is focused on separating the individual pieces of what is being studied by taking into consideration only some parts and analyzing them in a linear manner, whereas systems thinking is targeted at seeing the “whole picture” of different interconnections, links and factors. Systems thinking is about a better and more integrated understanding of why

things happen a certain way, while traditional thinking tend to view things in linear ways without considering other perspectives and its interconnections. Things are circular in systems thinking, and recognizing the complex nature of cause-and-effect relationships can help us to understand why things happen (Senge, 2008).

The idea of inclusion of sustainability and CSR in systems thinking has been explored by some scholars. Studies have been conducted regarding the infusion of sustainability in different fields with systems thinking (Nguyen, Graham, Ross, Maani & Bosch, 2012; Porter & Córdoba, 2009; Fiksel, 2006;). For instance, Fiksel (2006) recommended the use of systems thinking in sustainability projects that need to cover issues of climate change and other policies impacting on ecological and human systems. Porter and Cordoba (2009) drew from the systems theories ways of applying sustainable features to education systems. In addition, recent research have reviewed and analyzed how universities are defining and implementing sustainability locally and discussed the complex links with sustainability discourses [Lean et al., 2019, Adams et. Al., 2018) by integrating sustainability issues in the curricula, research, outreach and campus operations.

Furthermore, the importance of systems thinking is even greater in the context of different ongoing discourses of sustainability and CSR that have different solution-searching trajectories and paradigms of transformation. Literature review suggests that there has been identified three main trajectories of sustainability that rely on different values, processes and understandings of the changes and transformations required for sustainability (Adlof and Neckel, 2019), thus implicating the complexity of sustainability discourse and the need for systems thinking among different approaches and trajectories:

- The first trajectory is based on the eco-modern paradigm that advocates for green economy supported by technological progress as the primary strategy to build sustainable futures.
- The second trajectory is based on social transformation, which, in contrast to the former, challenges the current economic system by advocating for a radical change such as in the case of the degrowth movement.
- The third trajectory is based on the resilience paradigm, promotes anticipating and controlling risks while finding solutions through socio-technical mechanisms.

A wide range of interconnected issues calls for promoting and developing competences for systems thinking. Clarke (2001) outlines several characteristics of systems thinking; thus, it allows us to consider several implications on how those characteristics affect sustainability education:

- Systems thinking incorporates a “both / and” logic rather than an “either / or” logic. This approach encourages to view sustainability as integrative and

holistic processes.

- Systems thinking assumes a living universe and encourages to view phenomenon not as a machine but as an organism.
- Systems thinking is ecological thinking and calls for the functional understanding of how systems work.
- Systems thinking recognizes that we live in a participatory universe, where we are creators of knowledge and, in turn, gained knowledge always reflects the subjective perspectives of those who created it.
- Systems thinking is both global and, at the same time, local.
- Systems thinking promotes the long-range view by favouring decisions in the context of future generations.

In the discussion of education for sustainability, it is important to address the issue of complexity and interdisciplinary / transdisciplinary dynamics as many sustainability-related issues and problems are highly complex and include many agents and factors. In this respect, students are required to have a strong knowledge base in order to understand the complex issues and linkages of sustainability by obtaining knowledge about environment, economy, society and culture. In turn, this knowledge should extend towards understanding of local, national, and global issue interdependence by being able to assess the cross-national, cross-sectoral, cross-disciplinary dynamics of sustainable development. Therefore, students are required to develop such capabilities that would allow them assess and appreciate many complex interdependencies in problem-solving and seeking solutions. Indeed, education for sustainability includes the analysis and comprehension of many complex concepts underlying sustainable developing like the following subjects (Brazdauskas, 2015):

- The limited carrying capacity of the Earth and the capacity of ecosystems to support continued growth in population numbers, resource consumption, and waste production;
- Interdependence of our society and natural systems;
- The value of biological, social and cultural diversity in maintaining the wellbeing of our planet and our society;
- Ecological footprint as the area of land and water needed to support the total flow of energy and materials consumed by a community or population;
- Biodiversity as the diverse and interdependent composition of life forms in an ecosystem that is necessary for sustaining flows of energy and materials indefinite;
- Intergenerational equity as a consideration of the need to live off net resource production rather than environmental capital in order to enable future generations access a world that is at least as diverse and productive as the one each generation inherits;
- Human rights as the fundamental freedoms of conscience and religion,

expression, peaceful assembly and association which ensure access to democratic participation and the meeting of basic human needs;

- The essential role of equity and justice in a sustainable society;
- The presence of uncertainty and the need for precaution in decision-making that will affect society, and subsequently, affect the natural systems.

Following this perspective, it is important to note that systems thinking constitute complementary capacities to promote the understanding of multi-dimensional sustainability complexity. Recent research suggests that there is a growing importance to develop systems thinking in education since system change is possible only upon human understanding of system thinking approaches (Senge et al. 2008). In this context the researchers emphasize that system change is possible upon evaluating the following points:

- Interdependence. In a world of growing interdependence, it's more important than ever to learn how to expand the boundaries and see the larger systems;
- Cross-boundary collaboration.
- Purpose-driven acting: Going beyond reactive problem solving and envisioning what future one would like to create.

Conclusions

Sustainability-oriented education encourages us to use integrative and systemic approaches to learning, develop and apply critical and system thinking skills to complex local, regional and global issues, think creatively and apply creative problem solving, question established ways of doing things, and be self-directed at investigating and proposing creative solutions to sustainability problems. The article put a high emphasis on an argument that educating for sustainability requires a highly complex and systems-thinking based approach since sustainable development calls for finding solutions for complex, trans-disciplinary, multi-agent, and multi-factor problems.

Indeed, higher education is uniquely positioned to play a leading role in supporting sustainable development, especially by promoting student systems thinking towards solving social and environmental challenges.

Guidelines for Applying Research to Practice

This paper provides concrete arguments and guidelines on how to promote systems-thinking for sustainability-oriented education. It may serve as a reference paper for teachers in order to emphasize the complexity of sustainability, the need for systems thinking towards addressing sustainable development problems that tend to be complex, trans-disciplinary, multi-agent, and multi-factor.

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Corresponding author:

Author can be contacted at: m.brazdauskas@vfv.viko.lt