Science-Society Interfaces— Transforming Universities

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Abstract

With the current imperatives around social justice and ecological disruption, the key challenge can be seen in the question of how to achieve vital changes, not whether. This question spills into a range of areas, and in an educational setting refers also to motivating stakeholders for engaging in sustainable change. The prospects of profound changes are more and more often discussed in terms of bottom-up social, cultural and institutional transformations, rather than top-down structured (technological) transitions. Crucially, the question of unsustainability is systemic, i.e. interwoven with our broadly understood socio-economic structures, beliefs, everyday decision and practices, to name just a few pieces of the puzzle. In tracking the roots of the current challenges, universities seem particularly relevant in terms of their transformative potential as they shape societal development via outreach and educating future generations. Seeing higher education among the major driving forces for transformations, we focus on transformative universities and their role in providing science-society interfaces and further supporting related participation processes. We highlight the difference between a transitory and a transformative approach to sustainable higher education. Herein, we devote special attention to university-based Regional Centres of Expertise on Education for Sustainable Development (RCEs), which we describe as learning communities encouraging different actors to explore change. Referring to transformative education, we emphasize the

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potential of RCEs to foster more sustainability-oriented pedagogic approaches such as experienced based learning and service learning.

1   Introduction

The severity of the ecological, economic and social crises that we are currently experiencing is broadly recognized. These multiple crises (Haberl et al. 2011; Brand et al. 2013; Leach et al. 2013; Scoones et al. 2015) are characterized by a myriad of issues such as growing inequality, austerity measures, biodiversity loss and mass extinction, to name just a few (see e.g. Raworth 2012; Steffen et al. 2015). Curiously, the nexus of environmental threats has been much more successful in drawing the attention of global governance than the older narratives of poverty and inequality, for example (Stirling 2015). Still, in this atmosphere of urgency, the role of political and other institutions and their abilities to contain crises comes to light and is being challenged (Scoones et al. 2015). As Stirling (2015) rightly points out, in light of such troubling realities, the key question is not whether changes are necessary, but rather how the necessary changes can be stimulated and achieved. However, debates on change are more often than not dominated by incremental tinkering of the status quo, rather than an overhaul system redesign and transformation (Naidoo 2014). The focus only on individual behaviour rather than the existing structures and powerful interests behind them as the core root of environmental degradation (Stirling 2014) is an example of a misreading of this systemic character.

This imperative of change is also deeply reflected in the area of education, as higher education institutions (HEI) are seen as major drivers in the process (Scott et al. 2012; Disterheft et al. 2013). To fulfil this transformative role, HEI need to transform themselves (Mader et al. 2013) and change their central functions and ways of interaction with the world outside of classrooms (Lozano 2006). Usually, such interactions with the "non-academic world" are restrained by a top-down approach focusing exclusively on knowledge transfer and incremental change rather than on a participatory dialogue between different domains of knowledge, interests and value systems (Sneddon et al. 2006). Consequently, the transformative process is neither driven by the necessary integration of stakeholders inside and outside HEI, nor supportive in region-specific sustainability challenges. Facing these current limitations to the transformative power of HEI, our purpose is to provide an outline of how sustainable change processes can be conceptualized and realised in the context of HEI.

In this chapter, we first look into how change is talked about in terms of transition and transformation. Therein, we aim to emphasize the implications that these two discourses have for the involved interests and actors. Importantly, the concept of transformation, borrowed from political setting, is applied to a broader context of change towards "a more just and sustainable society" (Brand and Daiber 2012: 4). Having prepared the conceptual grounds, we move on to the educational realm to apply the outlined transition/transformation considerations to HEIs. The promise of transformative potential of HEIs can be fulfilled in manifold ways. We devote special attention to university-based Regional Centers of Expertise on Education for Sustainable Development (RCEs). These science-society interfaces hold the potential to foster transformation via developing and integrating sustainability-oriented pedagogical approaches and enhancing the engagement of stakeholders in education fur sustainable development (ESD). We conclude with a discussion and point to possible further areas within the topic in need of investigation.

2   Discourses of Change

The question of how the essential technological, political, economic and cultural changes can be achieved has opened manifold debates on conceptualizations of change processes, with what can be called transitional and transformational thinking at the core. In considerations of change, particularly in terms of sustainability, this 'general heuristic distinction' into transition and transformation has been largely discussed by Stirling (2011, 2014, 2015). Within the context of scientific framings of growing environmental threats and various forms of insecurity and injustice, Stirling points to the generally stronger recognition of the need for change. Still, he remarks on the predominance of authoritarian apocalyptic discourses locating individual behaviour at the core of the issues, and reinforcing the belief in managing such behaviour as *the* solution. He explores practical implications of transition and transformation as two understandings of change. In what follows, we sum up the line of argumentation behind the distinction, preparing the ground for moving to the educational realm.

In the case of transitions, a given change process takes place in an atmosphere of structured control and management, frequently with technological innovation as key driver. This control and management often lies within the hands of the incumbent structures and actors, feeding into the existing distribution of power (Stirling 2014, 2015). The support of incumbent interests is often enabled through governmental funding (Shove and Walker 2007), while the less-concentrated initiatives of citizens, consumers and civil society fall into neglect (Seyfang and Smith 2007). Thus, the questions of power and diversity are downplayed. For example, in transitional thinking diversity is not necessarily understood as a source of creativity. Rather, reducing it is often seen as necessary, as "strong incentives push for 'integrated' frameworks, justifying 'complete' interpretations, 'definitive' explanations or 'robust' prescriptions" (Stirling 2011). Moreover, in such framing,

uncertainty tends to be pushed away from the picture, mainly by the preference for deterministic understandings that inform evidence-based policy (ibid.). This illusion of control becomes particularly problematic in the face of global climate issues, where values such as humility and responsibility for the human activity and its consequences give way to a quest for presumed static idealised optimum (Stirling 2014).

Such an approach finds its expression in sustainability transitions literature, particularly in Transition Management (TM). A transition is defined as "a fundamental change in the structures, cultures and practices of a societal system, (…) altering the way it functions" (de Haan and Rotmans 2011: 90–91). These marked changes have been researched primarily within socio-technical systems, focusing on the infrastructures of provision and supply, and resting on a co-evolutionary view of technology and society (Rip and Kemp 1998; Geels 2004, 2012). Since the late 1990s, the term has been conjoined with the concept of normative changes towards sustainability (Markard et al. 2012). TM uses a model that operates according to principles developed with policy makers (Kemp 2010), and introduces a four-level structure. The strategic level is where societal problems are restructured towards reaching a joint agenda through stimulating a social learning process among a network of front-runners. The agenda is further specified and implemented on the tactical level where system structures are built up and broken down. Actors and their every-day decisions gain importance at the operational level in transition experiment, while evaluation of a given transition process and possible adjustments happen at the reflexive level (Kemp et al. 2007; Loorbach and Rotmans 2010). Sustainability transitions and TM in particular, reinforce the technological fix, and embody the incumbent-dominated managerial approach. Diversity is theoretically recognized, yet practically stifled. While not denying the merit of a great body of knowledge generated by transition research, such practices often lead to only minor changes to the existing situation or "tweaking the system" (Stirling 2015).

Transformations, to the contrary, broaden the understanding of change through embracing both social and technological innovations (Seyfang and Haxeltine 2012). The incumbent structures and actors are challenged by a diversity of 'emergent and unruly political re-alignments' in change processes driven by a plurality of divergent knowledges. Plurality, along with contention and struggle, appear to be the key word, and is also reflected in pursuing non-deterministic, contending, often unknown ends. Existing rules and values, along with related power implications, are called into question (Fischer-Kowalski and Hausknost 2014; Stirling 2014, 2015). Values here refer to a range of virtues and social qualities rather than utilitarian seeking of prescribed goals. Control gives way to mutual care in high appreciation of diversity and democracy. As such, transformation emphasizes the role of civil society and social movements voicing alternate interests (Seyfang and Smith 2007), and values complex and deeply plural 'culturing' of a given change process. Bottom-up activities, therefore, are put to the fore as the source of more profound changes than orchestrated top-down transitions.

To illustrate this framing, Stirling lists a number of examples, e.g. within food production and use as expressed in ecological farming, local supply chains, or intensification of collective ownership (2014, 2015). These changes in culture and practice in the sector reflect diverse knowledges and bring non-incumbent interests to light, thereby coming closer to transformation rather than transition. Also, sustainability itself is seen as a concept that entered the global agenda via a plurality of contested voices, rather than apolitical procedures (Stirling 2015). Fitting examples can be found among certain practices of sharing or collaborative economy i.e. digital platforms and offline activities ranging from recirculation of goods, increased utilization of durable assets, exchange of services, and sharing of productive assets (Schor 2014). Sharing economy activities can be peer-to-peer or business-to-peer, with both non-profit and for-profit orientation. Starting from the definitional fuzziness, the concept is suffering from an array of issues. The questions of profit-maximization and the introduction of venture capital, the "corporatization of a number of the leading players" (ibid.: 2), can be given as an example. Such developments are often claimed to disturb the visionary picture of societies that are fairer, more sustainable, and more socially connected, drawn by key supporters. Leaving the debates aside, transformative potential could lie in e.g. the proliferation of maker spaces, skill-sharing platforms, as well as initiatives such as Peer-to-Peer University as attempts of democratizing access to education and enabling more peer teaching. Importantly, both for- and non-profit organizations are in an urgent need of redefining legal structures in terms of ownership and labour regulations (Orsi 2013)—a need that is put on the agenda thanks to the plural voices of this non-unified movement. Thereby lay certain aspects of transformative thinking. The broader impact of the concept, in line with Schor (2014), will depend on further developments once the current critical juncture the concept found itself in is passed. One might imagine that such a juncture functions as a scene where the ideas behind transition and transformation play a major role.

Finally, Stirling's distinction is not to be taken as a clear-cut dichotomy. Rather, the point, as the author himself puts it, is that:

> if the distinction is not made (by whatever names), then governance knowledges and discourses (as well as practices) in any given sector are vulnerable to systematic subversion by incumbent interests to channel more around expediently controlled transition than inconveniently emergent transformation (Stirling 2015: 62).

Keeping this in mind let us move on to the educational realm and consider the role of HEIs in change processes.

3   Knowledge and Change

3.1   Transformative Universities

HEIs have a significant role in promoting sustainability and contributing to a paradigm shift towards a more sustainable future. A growing number of

international treaties and policy statements underline that universities are bound to transform prevailing epistemic assumptions (Disterheft et al. 2013; Fadeeva et al. 2014). Universities represent important vehicles to explore, test, develop, and communicate the context-specific conditions for sustainable change (Rammel et al. 2015). HEIs have the capacity to enhance sustainable change as they educate future generations (UNESCO 2004). At first glance, this focus on transformative universities seems to be based on international consensus. Nevertheless, a closer look reveals two approaches on the role of HEIs for sustainable development.

The first is rooted in the classic understanding of universities. Here, the main purpose of universities is to generate reliable scientific knowledge and to educate scientific experts whose goals are to tackle societal challenges (Fadeeva 2007). This perspective assumes a compartmentalisation of society and separates people and institutions into experts (producing knowledge) and non-experts (receiving knowledge). When facing current sustainability challenges, the primary role of scientists is to provide solutions to concrete problems such as climate change, unemployment or food insecurity. Herein, disciplines are of crucial importance. This disciplinary compartmentalisation isolates specific realms of concern and excludes potential interactions and co-creation of knowledge (Gibbons 1999; Moulaert et al. 2013). This approach is characterised by incremental change and improvement along current paths rather than paradigmatic change. It reduces higher education and scientific reasoning to "doing things better", meaning in a more efficient way, but without necessarily questioning the purpose, which in contrast would lead to "doing better things" (Sterling 2010). Such an understanding of scientific knowledge with its focus on expert-induced and expert-controlled change can be seen as a reflection of the transition approach explained in the previous section. It excludes not only the different perspectives and activities of non-academic stakeholders, but also different university stakeholders who are not in the position to provide official policy recommendations. The often stated whole-institution approach, which is seen as a basic requirement for ESD at HEIs (UNECE 2005) does not stop at the boundaries of the campus. Whole-institution means also that the university as a whole, with its stakeholders, must be seen as embedded within a concrete local, regional and international sustainability context.

Emphasis on expert knowledge has limited capacity to induce real change, since it rests on improvement of the status quo rather than on a paradigmatic shift in the ways we learn, teach, and do research. This has provoked increasing criticism over the last years, and opened up a new perspective on transformative universities (Crow 2007; Miller et al. 2011). Pathways towards a more sustainable future do not rely on more knowledge transferred by scientific experts (Orr 2004). Sustainable development is driven by values, participation and social learning. Ideally, it represents a dialogue between different domains of knowledge and interests, and cannot be reduced to the problem of insufficient knowledge (Sneddon et al. 2006; UNESCO 2006). To open this dialogue, universities need to recognize and combine the multiple ways and domains of knowledge (epistemological pluralism) as well as

integrate the variety of perspectives, knowledge systems and values (reflexivity) (Miller et al. 2011). This demand for epistemological pluralism and reflexivity is in line with the need for bottom-up social, cultural and institutional transformations. It goes hand in hand with a strong focus on engaging university stakeholders in ESD. In contrast to what we would call transitory approach to universities, which enables a few experts from selected disciplines to transfer their knowledge and influence policy making, transformational approach calls for active participation across the boundaries of HEIs and across internal hierarchies. The latter opens new fields of engagement for both university-based and outsider stakeholders.

3.2 Transformative Education in Higher Education

The ability to teach, motivate and enable students as agents of change is reflected at universities through epistemological pluralism, reflexivity and a general transformative focus as structural and integrative elements. Enhancing the transformative abilities of students displaces the current stress on knowledge acquisition and cognitive engagement. Rather, it fosters capabilities such as interdisciplinary thinking, teamwork and reflexivity, and supports values, behaviours, and activities that enable sustainable development (Hicks 2002; Sipos et al. 2008). However, before universities can unfold their transformative capacity as well as the transformative capacity of their students, they need to transform themselves (Mader et al. 2013). The consequences of this transformational process are enormous, the implications for the daily life of universities most radical (Lozano 2006; Thomas 2009). This reorientation of universities is characterised by a broader understanding of learning processes and a subsequent bridging between learning and doing, but most of all it is a reorientation towards transformative education.

Transformative education can be described as an educational framework providing open learning processes for initiating a structural shift in the basic conditions of thoughts, feelings and actions. This approach to teaching and learning includes cognitive, emotional and activity-oriented aspects and attempts to facilitate the recognition of our worldviews while enabling paradigmatic reconstruction (Sipos et al. 2008; Sterling 2010; Thomas 2009). The linkages between transformative education, sustainability and education for sustainable development (ESD) were emphasized by authors such as Lange (2012) or Tilbury (2004). Especially the implementation of ESD key principles in HEIs expresses a radical shift from a traditional concept of education towards a stronger transformative view of pedagogy and participatory learning for change (Sterling 2010). Bridging transformative education with ESD calls for participatory learning environment that supports an open dialogue between different disciplines and stakeholders outside the academic community. Transformative teaching and learning unfolds across a transdisciplinary setting and aims at experiences outside the classroom, thereby enhancing the engagement of students, teachers and researchers in ESD Hence, we stress the importance of institutionalized science-society interfaces at universities.

3.3 Science-Society Interface: Regional Centres of Education for Sustainable Development

Broadly speaking, science-society interfaces provide an institutional and transdisciplinary setting for teaching and learning. They enable collaborations between different actors, including scientists, enterprises, NGOs, city administrators, communities or educational institutions. Global examples for science-society interfaces are the more than 130 Regional Centres of Expertise on Education for Sustainable Development (RCEs), based on an international initiative to implement the goals of the UN Decade of Education for Sustainable Development (2005–2014). As regional networks certified by the United Nations University (UNU), RCEs promote ESD through formal, non-formal and informal education and offer regional platforms for learning, stakeholder engagement and alliances for sustainable development. An RCE can be understood as a learning community, which encourages different societal actors to explore epistemic change and transformations as a collaborative inquiry. RCEs share the fundamental idea of epistemological pluralism and reflexivity, recognizing that in questions of sustainability there is no sufficient intellectual authority of single forms of knowledge (Fadeeva 2007).

RCEs provide many cases for pioneer work in the area of changing the curricula towards transformative teaching and learning (Mochizuki and Fadeeva 2008; UNU-IAS 2014). As transformative learning processes are driven by personal engagement and stimulate a critical reflection on experience (Taylor 2007), RCEs can offer a setting of real-life learning through interactions with various stakeholders, and integrate regional challenges of sustainability into the curricula, therefore opening possibilities for trandisciplinary learning. For involved citizens from outside the university, participation in such transdisciplinary learning processes provides an arena for popularizing their concerns and supports their engagement in change (Novy et al. 2013).

Putting an emphasis on co-development of knowledge for sustainability at the very heart of the learning process, RCEs support the development of more sustainability-oriented pedagogic approaches such as experienced-based learning. Experience-based learning motivates the learners to analyse their experience by reflecting, evaluating and reconstructing it (Andresen et al. 2000; Lester et al. 2005). For RCEs, experienced-based learning is of special interest as it embodies ESD principles and acknowledges real-life problems for developing necessary capacities (Barth et al. 2014). One of the examples of experience-based learning is service learning (SL). SL reflects an alternative teaching approach where students are confronted with specific regional problems and try to find solutions in cooperation with different stakeholders (Stuteville and Ikerd 2009). SL focuses on participatory learning and giving service to the community, and increases the engagement of students in regional ESD processes. At the same time, it fosters knowledge exchange between science and society and supports the focus on

regional and local challenges. SL requires the faculty to reconsider expert-controlled change and linear knowledge transfer. Its transformative character is also highlighted by its ability to engage learners in regional sustainability problems as active citizens via building both factual knowledge ("knowing-that") and procedural knowledge ("knowing-how") (Barth et al. 2014).

4 Perspectives and Concluding Remarks

Heading towards the end of our considerations, we stress yet again that in the current context of the myriad of ecological and social injustice, it is no longer the question of *whether* to change, but rather *how* to do it. Within educational realm, this question extends also into searching for ways of increasing the engagement of diverse stakeholder groups in the processes of sustainable change. As discussed, rendering answers to the *how* question can possibly start from drawing a heuristic distinction between the concepts of transition and transformation.

Taking the discussion to the area of HEIs enables us to see certain linkages corresponding to the above distinction and helps us clarify the crucial role of universities as drivers of sustainable change. The classic understanding of universities as the ground for expert knowledge production, and further preaching of the knowledge to the non-expert crowd brings immediate associations with the concept of transition. Such an approach accords with the divide between the institution of universities and societies it is embedded in. Here, if change processes are at stake, they are expert-induced and expert-controlled, and knowledge is transferred in a linear manner. To the contrary, the plenitude of discussions on sustainable development that entered educational realm lead to questioning of such understanding of the role of HEIs and brought transformative universities with transformative learning to the fore. In this approach, plurality of knowledge and reflexivity that integrate various perspectives, values and knowledge systems from outside of traditionally-drawn academic boundaries are basic and enable paradigmatic change. The emphasis falls on bridging learning and doing in an environment open to non-academic voices, where diversity and uncertainty come to the fore.

Within HEIs, this openness and transdisciplinarity can be fostered by institutionalized science-society interfaces—such as RCEs—functioning as arenas of collaborative inquiries and mutual learning for a range of actors, from students, through researchers, enterprises, civic society organizations, communities and local governments. Therefore, RCEs open spaces for contending knowledge to be explored both within and outside of academic setting in order to engage in societal transformation towards a sustainable future. Importantly, even though RCEs are originally set up via the institution of the UNU, the network itself is governed in a decentralized manner, and individual RCEs are free to take action according to their own vision and focus. On a cautionary note, this freedom can be seen as a

transition/transformation junction, similarly to our example of collaborative economy.

Particularly for the issue of integrating various stakeholders of HEIs in ESD, both approaches have different implications. Expert-driven knowledge transfer characteristic of transition discourse enables a few scientists to shape science-society dialogue based on the traditional compartmentalisation between experts and non-experts. Even though the potential for shaping policies is high, the risk of the proposed changes to follow only the lines of increased efficiency and 'optimisation' of the status quo is strongly present. This approach neither reflects the plurality of knowledge systems, different values and social learning which drive sustainable development, nor does it benefit from the capacity of change and innovation brought by the nexus of teachers, researchers, students and university administration. To take another example, implementing SL can be one of the means chosen by an RCE feeding into redefining teaching and learning towards more heterogeneity and contention explored in real-life settings. However, the composition of involved non-academic stakeholders influences the quality and value of a given SL. Involving mainly incumbent companies and organizations from a specific focal area underlines the dominant and suppresses the alternate interests, and brings questions of power and control to mind. In contrast, a stronger focus on the transformative power of HEI acknowledges the high importance of a genuinely open dialogue between science and society. Such an approach calls for active participation across both the external and internal boundaries of HEIs. It fosters transdisciplinary work on concrete regional projects, hence possibly increasing stakeholder engagement for ESD.

In this chapter, we attempted to discuss different ways of conceptualizing change and the implications thereof for the HEI context. Focusing on the RCEs as institutionalized science-society interfaces, we see further necessary steps in more empirical research looking into how these different ways find their reflection in practice in terms of stakeholder engagement. This brings us back yet again to the key question of *how*—a question that members of each RCE, and HEIs, working towards (contested) transformative ends needs to consider.

References

Andresen L, Boud D, Cohen R (2000) Experience-based learning. Experience-based learning: contemporary issues. In: Foley G (ed) Understanding Adult Education and Training. 2nd edn. Allen & Unwin, Sydney, 225–239

Barth M, Adomßent M, Fischer D, Richter S, Rieckmann M (2014) Learning to change universities from within: a service-learning perspective on promoting sustainable consumption in higher education. J Clean Prod 62:72–81

Brand U, Daiber B (2012) The next oxymoron? Debates about strategies towards transformation. Journal für Entwicklungspolitik (Austrian Journal of Development Studies), XXVIII(3):4–6

Brand U et al. (2013) Debating transformation in multiple crises. In ISSC/UNESCO, World Social Science Report 2013: Changing Global Environments. OECS Publishing and Unesco Publishing, pp 480–484

Crow MM (2007) None dare call it hubris: the limits of knowledge. Issues Sci Technol 23(2): 29–32

de Haan J, Rotmans J (2011) In transition: understanding complex chains of change. Technol Forecast Soc Chang 78:90–102

Disterheft A, Cairo S, Azeiteiro U, Leal Filho W (2013) Sustainability Science and Education for Sustainable Development in Universities: a way for transition. In: Cairo S, Leal Filho W, Jabbour C, Azeiteiro U (eds) Sustainability Assessment Tools in Higher Education Institutions: mapping trends and good practices around the world, Springer, Berlin, pp 3–27

Fadeeva Z (2007) From centre of excellence to centre of expertise: regional centres of expertise on education sustainable development. In: Wals AEJ (ed) Social learning: towards a sustainable world. Wageningen Academic Publishers, Wageningen

Fadeeva Z, Galkute L, Mader C, Scott G (2014) Sustainable Development and Quality Assurance in Higher Education. Palgrave Macmillan, UK

Fischer-Kowalski M, Hausknost D (2014) Large scale societal transitions in the past. WWWforEurope Working Paper No. 55, pp 1–65

Geels F (2004) From sectoral systems of innovation to socio-technical systems: insights about dynamics and change from sociology and institutional theory. Res Policy 33(6/7):897–920

Geels F (2012) A socio-technical analysis of low-carbon transitions: introducing the multi-level perspective into transport studies. J Transp Geogr 24:471–482

Gibbons M (1999) Science's new social contract with society. Nature 402:81–84

Haberl H, Fischer-Kowalski M, Krausmann F, Martinez-Alier J, Winiwarter V (2011) A socio-metabolic transition towards sustainability? Challenges for another great transformation. Sustain Dev 19:1–14

Hicks D (2002) Lessons for the future: the missing dimension in education., Futures and education seriesRoutledge Falmer, London

Kemp R (2010) The Dutch energy transition approach. Int Econ Policy 7:291–316

Kemp R, Loorbach D, Rotmans J (2007) Assessing the Dutch energy transition policy: how does it deal with dilemmas of managing transitions? J Environ Policy Plann (special issue on "Governance for Sustainable Development. Steering in contexts of ambivalence, uncertainty and distributed control"), 9(3–4):315–331

Lange E (2012) Transformative learning through sustainability and the new science. In: Taylor EW, Cranton P (eds) The handbook of transformative learning. Jossey-Bass, San Francisco, CA, pp 195–211

Leach M, Rawroth K, Rockström J (2013) Between social and planetary boundaries: navigating pathways in the safe and just space for humanity. In ISSC/UNESCO, World Social Science Report 2013: Changing Global Environments. OECS Publishing and UNESCO Publishing, pp 84–95

Lester SW, Tomkovick C, Wells T, Flunker L, Kichul J (2005) Does service learning add value? Examining the perspectives of multiple stakeholders. Acad Manag Learn Educ 4(3):278–294

Loorbach D, Rotmans J (2010) The practice of transition management: examples and lessons from four distinct cases. Futures 42:237–246

Lozano R (2006) Incorporation and institutionalization of SD into universities: breaking though barriers to change. J Clean Prod 14:787–796

Mader C, Scott G, Razak DA (2013) Effective change management, governance and policy for sustainability transformation in higher education. Sustain Acc Manag Policy J 4(3):264–284

Markard J, Raven R, Truffer B (2012) Sustainability transitions: an emerging field of research and its prospects. Res Policy 41(6):955–967

Miller T, Munoz-Erickson T, Redman C (2011) Transforming knowledge for sustainability: towards adaptive academic institutions. Int J Sustain High Educ 12:177–192

Mochizuki Y, Fadeeva Z (2008) Regional centres of expertise on education for sustainable development: an overview. Int J Sustain High Educ 9(4):369–381

Moulaert F, MacCallum D, Mehmood A, Hamdouch A (2013) The international handbook on social innovation: collective action, social learning and transdisciplinary research, Cheltenham, UK

Naidoo K (2014) Boiling point: multiple crises and the Democratic deficit. Interview by Allen White. Great transition initiative. Tellus Institute, June 2014. http://www.greattransition.org/. Accessed 01 May 2015

Novy A, Habersack S, Schaller B (2013) Innovative forms of knowledge production—transdisciplinary and knowledge alliances. In: Moulaert F, MacCallum D, Mehmood A, Hamdouch A (eds) The international handbook on social innovation: collective action, social learning and transdisciplinary research. Edward Elgar, Cheltenham, UK, pp 430–441

Orr D (2004) Earth in mind: on education, environment, and the human prospect. Island Press, Washington, D.C

Orsi J (2013) Practicing law in the sharing economy: helping people build cooperatives, social enterprise, and local sustainable economies. American Bar Association

Rammel C, Velazquez L, Mader C (2015) Sustainability assessment in higher education institutions: what and how? In: Barth M, Michelsen G, Rieckmann M, Thomas I (eds) Routledge handbook of higher education for sustainable development. Routledge, London

Rawroth K (2012) A safe and just space for humanity—can we live within the Doughnut? Oxfam Discussion Papers, pp 1–16

Rip A, Kemp R (1998) Technological change. In: Rayner S, Malone L (eds) Human choice and climate change, vol 2 resources and technology. Battelle Press, Washington, D.C., pp 327–399

Schor J (2014) Debating the sharing economy. Great transition initiative

Scoones I, Newell P, Leach M (2015) The politics of green transformations. In: Scoones I, Leach M, Newell P (eds) The politics of green transformations. Earthscan from Routledge, London

Scott G, Tilbury D, Deane L, Sharp L (2012) Turnaround leadership for sustainability in Higher Education Australian Government. Office for Learning and Teaching Canberra, Australia

Seyfang G, Haxeltine A (2012) Growing grassroots innovations: exploring the role of community-based initiatives in governing sustainable energy transitions. Environ Plann C Govern Policy 30(3):381–400

Seyfang G, Smith A (2007) Grassroots innovations for sustainable development: towards a new research policy and agenda. Environ Politics 16(4):584–603

Shove E, Walker G (2007) CAUTION! Transitions ahead: politics, practice, and sustainable transition management. Environ Plann A, 39(4):763–770

Sipos Y, Battisti B, Grimm K (2008) Achieving transformative sustainability learning: engaging head, hands and heart. Int J Sustain High Educ 4(1):68–86

Sneddon C, Howarth R, Norgaard R (2006) Sustainable development in a post-Brundtland world. Ecol Econ 57(2):253–268

Steffen W, Richardson K, Rockström J, Cornell SE, Fetzer I, Benett EM, Biggs R, Carpenter SR, de Vries W, de Wit CA, Folke C, Gerten D, Heinke J, Mace GM, Persson LM, Ramanathan V, Reyers B, Sörlin S (2015) Planetary boundaries: guiding human development on a changing planet. Science 347(6223):736–745

Sterling S (2010) Transformative learning and sustainability: sketching the conceptual ground. Learn Teach High Educ 5(2010–11):17–33

Stirling A (2015) Emancipating transformations: from controlling 'the transition' to culturing plural radical progress. In: Scoones I, Leach M, Newell P (eds) The politics of green transformations. Earthscan Routledge, London, pp 54–67

Stirling (2014): Emancipating Transformations: from controlling 'the transitions' to culturing plural radical progress. STEPS Working Paper 64. STEPS Centre, Brighton

Stirling (2011) Pluralising progress: from integrative transitions to transformative diversity. Environ Innov Societal Transitions 1(1):82–88

Stuteville R, Ikerd J (2009) Global sustainability and service-learning: paradigms for the future. Int J Organ Anal 17(1):10–22

Taylor E (2007) An update of transformative learning theory: a critical review of the empirical research (1999–2005). Int J Lifelong Educ 26(173–19):1

Thomas I (2009) Critical thinking, transformative learning, sustainable education, and problem-based learning in universities. J Transformative Educ 7(3):245–264

Tilbury D (2004) Environmental education for sustainability: a force for change in higher education. In: Corcoran PB, Wals AEJ (eds) Higher Education and the challenge of sustainability: problematics, promise, and practice. Kluwer Academic, Dordrecht, pp 97–112

UNECE (2005) UNECE strategy for education for sustainable development. Vilnius: high-level meeting of environment and education ministries. Available at: http://www.unece.org/environmental-policy/education-for-sustainable-development/about-the-strategy-for-esd/the-strategy.html

UNESCO (2006) Framework for the UNDESD international implementation scheme. UNESCO Education Sector

UNESCO (2004) Higher education brief for the decade of education for sustainable development (2005–2014). UNESCO, Paris

UNU-IAS (2014) Building resilient future through multistakeholder learning and action. Ten years of regional centres on education for sustainable development. UNU-IAS, Tokyo

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