

Review

From Learning Ecologies to a Social Ecosystem Model for Learning and Skills

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Abstract: The growing relevance of socio-ecological systems (SESs) thinking reflects both the challenges of an anthropogenic poly crisis and attempts to understand the complexities of societal development in an era of globalisation. The article begins by suggesting there are two related variants of SES thinking; relationships between the natural and human worlds (Variant 1) and whole social and human system analysis using metaphorical transfer and theorisation of natural ecological principles (Variant 2). This article elaborates Variant 2 through the development a social ecosystem model (SEM) applied to post-compulsory education and skills development. An exploration of the SEM is conducted through a review of the literatures on ‘Learning Ecologies’ to assess the strengths and limitations of this human ecological approach. Perceived limitations are addressed by the development of the SEM that adds a political economy dimension to the learning ecological model, which is then applied to the field of learning and skills in the English context in support of an inclusive and place-based approach to vocational education and training (VET). The article concludes by suggesting that the SEM can be further expanded by its application to transitioning to more sustainable futures, being developed by scholars of indigenous communities and populations of the Global South, that arguably brings Variant 2 of SESs thinking closer to Variant 1.

Keywords: socio-ecological systems; learning ecologies; social ecosystem model; learning and skills; transitioning



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1. Introduction—Key Concepts and Distinctions

1.1. Socio Ecological Systems (SESs)—Two Variants

Social ecological system (SES) thinking, focusing the relationship between humanity and the natural world [1], has grown in recent decades due to a growing poly crisis—the entanglement of the climate/nature emergency with other global crises of inequality, mass migration and conflicts [2]—together with the challenges of understanding the complexities of economies and societies in the era of globalisation [3,4].

The focus of this article is not about social ecological systems *per se*, but on the elaboration of a particular variant and derivation—a social ecological model (SEM). A survey of the relevant literatures, however, suggests differing approaches to SES thinking of which two stand out. The first and most prevalent concerns conceptualising the dynamic relationship between human actions and natural ecological systems operating as a composite unit, highlighting issues of natural ecosystem governance, the development of resilient and adaptive systems and the use of local knowledge in these processes [5].

A second variant concerns an extension of ecosystem concepts, in which the dynamics of the natural world are applied to the human and social worlds to help conceptualise the complexities of modern and globalised societies [6,7]. This form of transfer involves both the use of metaphor and of theory. The second variant is explored here through the elaboration of what has been termed a social ecosystem model (SEM).

The first variant concerns the ‘direct’ relationship between humanity and the natural world, while the second suggests an ‘indirect’ relationship. However, both variants utilise

similar core terms and principles (e.g., balance, resilience and adaptability). While the second variant takes a step back from the natural world, its relative relationship arguably allows for social–ecological frameworks to be applied to understanding complex dynamics in different parts of society. It will also be suggested that this form social–ecological system thinking can acknowledge the role of economic and political power. Far from marking a break with the natural world, the emerging ‘political–economy–ecology’ model is refocused on the climate/nature crisis with its arguments for strategic interventions in this sphere. The return of Variant 2 to the concerns of Variant 1 is explored in the final section of the article through the concept of social ecosystem development for the Just Transition.

1.2. Variant 2—From the Natural to the Human and Social Worlds

In response to crisis and complexity, ecological thinking has been spreading from its origins in observations of the natural world and conservation to become a ‘metaphor’ used to reflect on the complexities and dynamics of the human and social worlds including child development and inclusion [8], entrepreneurial innovation and skills development [9–11], learning beyond the classroom [12], policy and politics [13] and professional practice [14,15], digital technologies, information systems, e-learning and social media [16–18]; the historical development of organisations [19] and adaptive processes of evolution, resilience, sustainability and change [20].

While the settings are diverse, this type of the thinking shares common features gleaned from the observation of complex dynamics of the natural world, notably inter-dependent relationships functioning as a composite unit, processes of adaption, conditions of stasis, development, fragility and resilience; and the shaping effects of ‘keystone species’ within an ecology [21]. When transferred to the human and social worlds, ecological perspectives emphasise viewing human behaviour in its physical, social and virtual environments and within specific cultural and historic contexts [22].

These foundational principles shared by both the natural and human worlds have led to ways of conceptualising education and the learning process beyond the boundaries of formal schooling, including flexible learning and collaborative network-based learning over the life course. Ecologically inspired open approaches to the education process can be contrasted with traditional, constrained, authoritarian and performative approaches to organisation, professional practice and learning [7,14]. With its increasingly metaphorical use, human–social ecological concepts have informed inter-disciplinary and reflexive approaches to knowledge development and practice through ‘adaptive doing’ [23]. In the world of system change, human and social ecological thinking comes with a distinct set of principles and values that emphasise pluralism and transparency in the reform of complex systems [24].

Thus far, human ecological concepts have been developed mainly in the Global North and particularly in the United States. However, the climate/nature crisis and the necessity of paths of sustainable and just transitioning have led to the study of human ecological concepts in the Global South and among indigenous populations globally. In the penultimate part of the article, the role of South African colleagues is acknowledged in further developing the social ecosystem model in the African context. In addition, a variant of human ecological thinking has been actively developed by scholars of indigenous populations, notably in North America [25], linking aboriginal approaches to learning with issues of community health and land stewardship. This recognition of the value of indigenous thinking and practice converges with similar approaches and concerns in the Global South. Implications for future sustainability developments arising out of alternative modes of human ecological thinking are briefly reviewed in the final parts of the article.

1.3. The Ecological Metaphorical Device—Some Implications of Conceptual Extension

The transfer of key concepts of the natural world to the human and social worlds was viewed historically by scholars of the Chicago School [26] as an extension of the original domain to aid understanding of processes of complexity and change. While used to develop

theories of population growth and urbanisation [27], the transfer of meaning in relation to education has tended to be metaphorical rather than theoretical [28,29]. This type of usage is subjected to a critical analysis to support the case for a more theoretical and whole-system approach to human ecosystem analysis applied to the case of education and skills.

The development of the human ecological ‘metaphorical device’ reveals both descriptive and illustrative strengths and conceptual limitations. Metaphors (the Greek root means to transfer or to carry) have been used to help human understanding by connecting images of two different things—one familiar and the other less so—to act as a ‘bridge’ between the concrete and the abstract [30]. Metaphors thus transfer meanings across discourses through the interplay of popular meanings and scientific concepts. In the process of transfer, they can move between rigorous and speculative meanings [31].

In this bridging function, the ecological metaphor demonstrates specific qualities and limitations. A particular strength lies in its role as a ‘correlational metaphor’ in which illustrations of the complex interactions of the natural world are used to aid understanding of the complexities of the human and social worlds. This functional strength, however, contains potential limitations. In the process of metaphorical transfer, particular meanings can change. A relevant distinction concerns the relationship between resilience and development. Natural ecological thinking has tended to focus on the processes of resilience and adaptation, whereas in social and human ecosystem thinking the emphasis has been more on societal growth and development [32]. There comes a point, therefore, when differences between the original usage and the new meaning become too great and act to undermine the plausibility of transfer. In the context of this widening gap, the metaphor moves from being ‘correlational’ to ‘analogous’ [33]. In this less rigorous condition, the metaphor needs to be further developed or retired. This article follows a developmental path through a conceptual movement from metaphorical usage in relation to learning ecologies to whole-system theory building (a social ecosystem model).

1.4. *Issues of Terminology—Ecologies and Ecosystems*

Differing variants of ecologies/ecosystems are also accompanied by varying terminologies. In the natural world, the terms ‘ecology’ and ‘ecosystem’ are closely related but differ in their application. An ‘ecological’ perspective is viewed as the study of the interactive behaviour of ecosystems. As such, ecosystems are seen as a sub-set of ecologies—units formed by the interaction of a community of organisms with the environment [34].

However, in the process of transfer from the natural to the human and social worlds, this distinction becomes blurred with the terms ecology and ecosystem often being used interchangeably. This is the case with the terms ‘learning ecology’ and ‘learning ecosystem’ and is thus reflected in the next section in a review of the ‘learning ecologies’ literature. However, later in the article when analysing the concept of ‘social ecosystems for learning and skills’, important distinctions are made. I suggest here that the term ‘learning ecologies’ is used mainly as an analytical tool to help the understanding and interpretation of complex systems and the dynamics of interdependent factors influencing the learning process, whereas the term ‘learning ecosystem’ is used in a variety of settings across public and private domains to refer to strategies to create dynamic whole-system approaches to learning, production and human development. Hodgson and Spours [35] clarified this further by distinguishing between an ‘ecology’ as a relatively neutral and generic concept of a setting involving the interaction of multiple factors that can have differing conditions of health and resilience. A ‘social ecosystem’, on the other hand, can be viewed in a more normative way that functions holistically to promote growth and social development. In the context of this article, therefore, the term ‘ecologies’ will be used in relation to its analytical function, whereas the term ‘ecosystems’ will re-enter the frame with the elaboration of an evolving social ecosystem model [28,29,36,37].

2. Learning Ecologies as Metaphor

The learning ecologies (LEs) metaphor has been encouraged not only in relation to the crisis–complexity nexus, but also as a reaction to dominant neoliberal education reform, notably the standardised, performative, mechanistic, politicised (and now failing) models of education associated with the global education reform model (GERM) [38,39]. Posited as an alternative approach to the educative process, human ecological approaches have tended to stress learning throughout the life course [40] and in varying societal settings [41,42], including the temporal and spatial dimensions of learning that connect the past and present [43], the role of community and networks in learning [12], combinations of formal and non-formal and informal learning [44], the impact of the physical space on learning [45], the role of places of learning other than schools [46,47] and understanding connections between classrooms, their communities and different learning sectors [48,49].

Utilised in these differing ways, the LEs metaphor has also been applied to different areas of education, including technologies and gender [50], collaborative learning in further education [35,51], designs for learning with technologies [52] and teachers' professional development [53]; personalised learning and lifelong learning [54]; and learning in higher education [55]. A recent review of the learning ecosystem literature [56] suggests that most research focuses on analysing hybrid learning activities that bridge the gap between schools and social spaces. However, as part of this literature review, Sangra and colleagues point to significant variability in terms of definitions (fragmentation), methodological approaches (observational and exploratory) and application (visible and submerged). This variability may be related to a still emerging field of human science.

2.1. Common Principles of Learning Ecologies Thinking and Practice

In these multifarious settings and functions, a review of the existing LEs literature suggests that the LEs metaphor comprises a range of key principles that can be seen to take it in a conceptual direction.

Principle 1. Critical reflections on existing education arrangements

Jackson and Barnett [7] argue that the key behaviours of the natural world—relationships and interdependence, growth and renewal and different elements working together—can be used to reflect on the challenges facing education and learning systems today. Hierarchical, mechanistic and performative early-21st-century educational systems could be seen to function in a restrictive way compared to that of a complex, holistic and responsive learning ecology. However, the stark difference between the connective ambition of the learning ecologies concept and the reality of the actual organisation of education globally points to one of the many challenges for this emergent ambitious concept; a point that will be returned to later.

Principle 2. Learning ecologies are situated

Barron [57] refers to learning ecologies as a set of contexts found in physical or virtual spaces that provide opportunities for learning and in which each context comprises a unique configuration of activities, material resources, relationships, and the interactions. Rietveld and Kiverstein [58] proceed to argue that the affordances the environment offers are dependent on the abilities available in a particular ecological niche.

Principle 3. A learning ecology as a holistic unit and an integrated conceptualization of learning

Within highly varied situations and contexts, Sangra and colleagues [56] see the potential for learning ecologies to provide an integrated and holistic conceptualization of learning that looks beyond the formal course to create a bridge to non-formal and informal learning experiences and thus provides a framework 'to understand how individuals select, experience, navigate and participate in learning experiences that span multiple contexts' [p1].

Principle 4. Self-regulatory learning

Closely related to Principle 3 is the potential to increase the level of learner control. Jackson [59] suggests that, in the context of much of higher education, for example, a learning ecology comprises self-regulatory learning within a set of inter-dependent relationships (e.g., contexts, spaces, affordances, resources and relationships) that connect a learner's past with a potential learning future.

Principle 5. A network of multiple learning contexts across different scalars

Following on from this learner-centred focus, Hecht and Crowley [41] caution against thinking of a learning ecology as having a centre with the learner in it. Instead, they suggest it is more fruitful to think of the learner as a player in a much wider network of multiple learning contexts.

The relationship between Principles 3, 4 and 5 points to an added layer of analytical complexity in which there is not simply one holistic relationship, but a 'multiverse' of learning ecologies and their relationships within a much larger system. This important observation is returned to later in the article when analysing the dynamics of the multi-level social ecosystem model.

Principle 6. Interdependence and collaboration

Sealy-Brown [21] extended the general concept of an ecology—defined as an open system with an interdependence of relationships, self-organising/regulating and adaptive—to identify the key collaborative characteristics of a learning ecology, comprising overlapping communities of interests, processes of cross-pollination and partially self-organising.

Principle 7. The dynamic relationship between people, technology and data

In the world of 'fintech', an example of an LE is focused on the dynamic relationship between people, technology and data [60], that helps organisations generate long-term benefits for employees (and thus for customers) by fostering creativity and innovation. In e-learning settings, Esposito and colleagues [61] see LEs as providing a holistic frame to interpret learning opportunities enabled by the current complex digital landscape. The rapidly developing world of social media, on the other hand, is seen by Velásquez and colleagues [18] as a new type of media ecology which requires an additional collection of metaphors to assist current understanding of novel communication technologies.

Principle 8. Learning ecologies move through differing timescales

Eco-social dynamics possess temporal dimensions that move through differing timescales and in which some move faster than others. Taken together they can be seen to form a bridge between past, present and future learning contexts and situations [43]. The idea of evolving 'ecological time' thus provides spaces for conceptualising learning for education as 'utopian thinking', with the ability to critique current society to imagine sustainable collective futures [62].

2.2. Some Critical Reflections

Strengths

In a multiplicity of ways, the LEs metaphor speaks to the conditions and progressive aspirations of learning in the 21st century in attempting to understand societal complexity and forging a contextual, flexible and interdependent vision of learning across different landscapes beyond formal schooling and in which the learner and learning is collaborative, self-regulatory and open to digital applications [42].

Limitations

While the use of the LEs metaphor is usually contextualised, an analysis of its different applications and interpretations suggests that as a networked concept the role of wider external forces have been underplayed [63]. The reasons for this vary, but an important limitation arises from what has been termed 'network idealism' [64] that can act to depoliticize the situation being represented [65], thus leading to overblown 'horizontalist expectations' [66]. Back to the LE world, the limitations of networked conceptions have led

Jackson and Barnett [7] to warn of the problems of analysing complex entities that can be fragile and subjected to powerful external forces.

Paradoxes

The LEs metaphor thus presents a paradox. It promises a holistic and system-based way of understanding learning opportunities, but a tendency towards idealistic usage lacks important considerations of the exercise of state power. This relative absence leads to an assertion of Principle No. 9, notably that the internal dynamics of a learning ecology are always subject to the shaping influences of external forces. The next part of the article therefore focuses on ways of understanding the array of wider economic, political and cultural forces at play that will necessarily influence the role of LEs.

3. From Learning Ecologies to a Social Ecosystem Model

3.1. The Evolution of Social Ecological Thinking

Despite its rapid spread, ecological and social ecological thinking remains relatively young and can be seen to be on an evolutionary path comprising four related stages that co-exist at any moment [28].

- Stage 1. A dynamic model of the natural world.
- Stage 2. A nature-based metaphor for understanding complex human activity.
- Stage 3. A conceptual social ecological model with a political economy dimension that influences learning and knowledge production systems (the current focus).
- Stage 4. A societal and global vision of transitioning to a post-Anthropocene society.

The main function of this article is the attempt to move from Stage 2 (the metaphorical stage) to Stage 3 (a theory-based framework) of social ecosystem building that recognises the fundamental role of political economy forces and factors. Earlier, a distinction was made between ecologies and ecosystems, in which ecological thinking was defined as a generic mode of connective analysis, whereas the term ecosystem referred to a strategic approach to building holistic, connective, resilient and sustainable social systems. Put another way, social ecosystems do not arise naturally; they are consciously constructed.

The movement from the learning ecology metaphor to a SEM for learning and skills draws on three sources of human ecological and political thinking—Uri Bronfenbrenner’s multi-level human ecological system [6,8]; components of David Finegold’s high skills ecosystems [11]—catalysts, nourishment, supportive environment and regional inter-dependencies—and the work of the Italian Marxist theorist Antonio Gramsci [67] on the relationship between governmental state/civil society and the role of public intellectuals. This conceptual synthesis leads to the following definition. The social ecosystem model functions as:

‘an evolving, place-based social formation that connects the worlds of working, living and learning with the purpose of nurturing inclusive, sustainable economic, social and educational development in diverse communities, localities and sub-regions’ [35] (p. 15).

Defined this way, the SEM is seen to operate within a wider political economy framework that can assist or frustrate the development of sustainable paths of development of a range of public/private domains including health, education and entrepreneurial or technological activities. Here, the SEM within the wider framework is applied to the world of learning and skills to help conceptualise a range of connective educative forms of thinking and activity throughout the life course.

3.2. An Expanded Social Ecosystem Model

A SEM is conceptualised as a ‘nested’ system comprising two main parts. First, a multi-level system in which the learning ecology/ecosystem forms an integral component. Part 2 sees this multi-level ecosystem embedded with a wider political economy framework. Together, Parts 1 and 2 constitute the ‘expanded SEM’ illustrated in Figure 1.

Part 1. A multi-scalar adapted social ecosystem

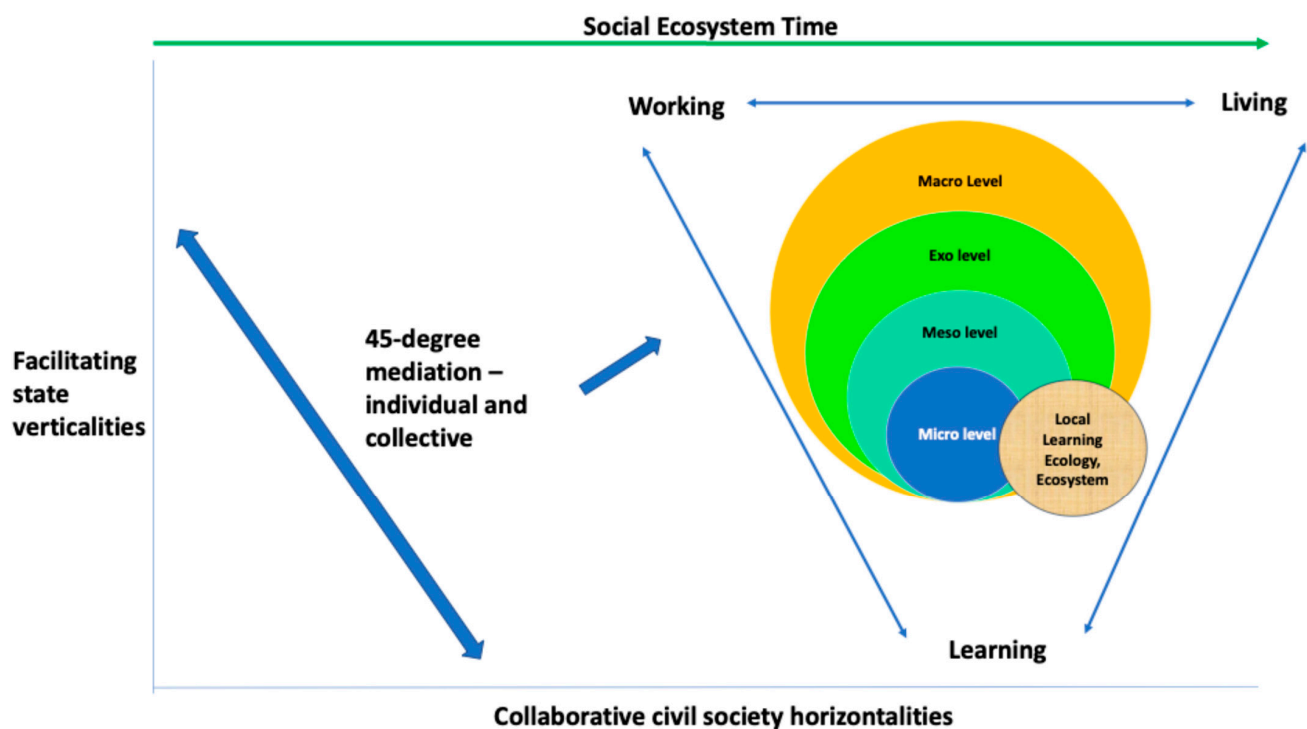


Figure 1. The social ecosystem model within its political economy framework. Scheme 2024.

Comprising the micro-, meso-, exo-, macro- and chronosystem levels, Bronfenbrenner's human ecological system [6,8] has been adapted from its original focus on the linked systems influencing the development of the child to help conceptualise the wider spatial, organisational and political economy characteristics of vocational education and training [68,69]. This model adaptation is briefly explained below in relation to Bronfenbrenner's five system levels.

1. 'Microsystem'—comprises the learner's immediate family environment and their immediate learning relationships, and thus stays close to the original Bronfenbrenner formulation.
2. 'Mesosystem'—the original concept of the mesosystem as comprising two or more micro systems has been given a more organisational emphasis in the adapted model, focusing on learning and skills institutions and their complex organisational and spatial relationships.
3. 'Exosystem'—the original definition focused on settings operating beyond the meso- and microsystems that, nevertheless, influence the development of the child. In the adapted version, the exosystem is conceived through a political economy lens to be concerned with 'middle range' factors and forces—the influence of the characteristics of the locality, regional economy and distributed technologies that link the learner and their organisational settings to the wider economy and society.
4. 'Macrosystem'—in the adapted model, Bronfenbrenner's original cultural system in which the child is immersed, is viewed more broadly as the totality of socio-economic, political and ideological relationships directly affecting learning and skills development.
5. 'Chronosystem'—the original focus on the life transitioning of the child is also given a more systemic focus in the adapted model, referring not only to the patterning of learning and transitions over the life course, but importantly the evolution of the SEM and its socio-political ecosystem framework. The chronological evolution of the totality of relations is understood here as 'social ecosystem time'.

Learning ecologies, the main principles of which were reviewed earlier, have been defined as holistic and integrated systems of learning that link formal and informal learning and are experienced across established boundaries and evolve through time. These learning

systems can be either large or small and thus contained within or span the SEM levels (see the LE illustration on the right of Figure 1).

Part 2. Dimensions of a political economy framework

The second conceptual development concerns an expansion of Bronfenbrenner's macro-system level into several political economy and temporal dimensions that affect not only the development of the individual learner but, also importantly, the evolutionary path of the expanded social ecosystem.

Dimension 1. 'Collaborative civil society horizontalities' comprise mainly local factors or forces of collaborative working including educational institutions, civil society organisation and local government.

Dimension 2. 'Facilitating state verticalities', on the other hand, include hierarchical national factors or forces that can exert inhibiting or facilitating influences on the development of the horizontal terrain. These state forces include global trends, national governments and regulatory agencies.

Dimension 3. 'Forty-five-degree mediation' refers to the role of organic public intellectuals (individual and collective) who work to develop the social ecosystem within the wider political economy system. Forty-five-degree mediation will necessarily involve the idea of a common mission to unite the potential mediating forces, the form of which can include individual social ecosystem leadership and collective institutional mediation between national and local levels.

Dimension 4. 'Social ecosystem time' refers to the role of the of the passage of time that acts upon learners, intellectual mediating forces and the evolution and development of the wider social ecosystem.

Part 1 (the multi-level SEM) and Part 2 (the political economy framework) have been brought together in Figure 1.

This political economy adaptation of the Bronfenbrenner ecological system levels suggests two conceptual possibilities. First, it provides an understanding of the trajectory of a personal ecosystem for learning and skills. A child, for example, will find that their learning is largely confined to the microsystem of immediate social relations (e.g., the family) and the meso level (e.g., school), whereas a young adult may traverse not only these-levels, but also local exo-scalars as part of vocational education and training. Second, related to these expanded horizons for action, the spatial model emphasises the mediating role of 'middle range' settings—the meso level (organisations for learning, their specialisms and technologies) and the exo level (local, sub-regional economic terrains)—that lie between individual learners and a national education and training system.

3.3. Dynamics of the Political Economy Framework

The dynamics of four dimensions of the wider political economy framework are explored in this section to suggest both facilitating and inhibiting possibilities.

Dimension 1. 'Collaborative civil society horizontalities'—while combining both vertical and horizontal forces, social ecosystems arguably work optimally when the horizontal is dominant and in which an open civil society terrain encourages collaborative social activity. Developing the terrain of civil society horizontalities, social ecosystems comprise those factors and forces that are essentially local in nature, including networks, local civic anchor institutions, workplaces, communities and place-based digital technologies operating in a collaborative way [37]. The 'area' or 'local place' is seen as a setting for economic, civic and educational development in which participatory networks are supplemented by local institution-building. Referred to as anchor institutions, relevant governance literatures have paid particular attention to the local role of universities in supporting place-based developments [70,71]. However, civic anchor institutions can be defined more broadly as organisations that, alongside their primary function, play a developmental role in by employing local people, leveraging local investment, boosting regeneration and supporting a sense of local identity [72,73]. In the world of learning beyond universities, civic anchor in-

stitutions would include community-based schools, further education colleges, workplaces and adult learning institutes [74] that ‘nourish’ [11] the local social ecosystem.

Dimension 2. ‘Facilitating state verticalities’—comprise national state policies and regulatory instruments [74] that, in the neoliberal era, have exercised significant negative effects on local government, education institutions and communities through an array of coercive devices such as funding levers, accountability regimes and performative measurement in the form of PISA together have been termed the global education reform model.

It is possible, however, for vertical factors and forces to develop a facilitating role to encourage economic, political and cultural developments across state and civil society. In the economic sphere, a progressive role could be represented by what has been referred to as the ‘entrepreneurial state’ to lead strategic investment and risk taking in shaping private markets [75]. In addition, in the political sphere, a facilitating state could also seek to empower local governments and citizens by devolving important powers to the local level through ‘democratic localism’ to rebalance national, regional and local relations [76]. In terms of education, devolutionary strategies could see curriculum and assessment being more professionally and locally shaped rather than being imposed from above, the present dominant situation in England in 2024.

Dimension 3. ‘Forty-five-degree mediation’—an expanded social ecosystem does not emerge naturally. In the context of adverse economic and social conditions of urban areas of the UK, the SEM will need to be nurtured into existence [35], through what Lawson [77] refers to as ‘45-degree politics’ that connect the horizontal and the vertical. In terms of the SEM, this connectivity is conceptualised as the process of ‘mediation’ [36] in which public or ‘organic’ intellectuals [67] can play a leading role. These mediating actors could include civic-minded and publicly committed professionals from the fields of education, local government, workplaces and from various civil society organisations including trade unions and civil society activists [78]. Mediation, understandably, is seen as a demanding mission requiring advanced capabilities that include a deep knowledge of the complexities of the locality and its key challenges and in which ecosystem leadership is required to foster a shared sense of mission between a variety of social partners and their specialisms [79]. Accordingly, social ecosystem leadership in the field of learning and skills could seek to combine the benefits of diverse perspectives with a common focus on lifelong learning, sustainable living and inclusive economic growth [35]. As part of what has been termed ‘collaborative horizontalities’ [80], socialised digital technologies would also be able to play an important connective role in which the networked locality could involve citizens as co-designers, co-producers and co-learners [81]. The extent to which there can be meaningful mediations of verticalities will depend, nevertheless, on progressive shifts in wider politics to offer these affordances [36,76].

Referencing back to natural ecologies, the roles of public intellectuals could be seen to resemble those of a ‘keystone species’ that disproportionately shape the overall ecosystem [82]. Achieving this influential role will require a high level of societal consciousness that contains within it a vision of a post-Anthropocene society [83] or what Laloux [19] has referred to as the ‘Teal’ self-regulatory stage of organisational development. In the social ecosystem path of evolution, such a vision constitutes Stage 4 with the potential to forge a vision of a positive future that we can actively shape and develop in the era of the Anthropocene rather than being resigned to simply living in ‘the expanded present’ [84]. Stage 4 and processes of societal transition are briefly explored in the final part of the article.

Dimension 4. ‘Social ecosystem time’—social and natural ecosystems demonstrate different concepts of time and development. Natural ecosystems are conceptualised as ‘time bound’ through their degeneration/regeneration cycles [85], whereas in human ecological systems model these cycles no longer apply, with the ‘chronosystem’ accounting for changes that occur over the lifespan, and which influence a person’s development, including major life transitions and historical events [86]. Dimension 4 in the SEM takes this principle of open evolutionary development through time a step further by linking the patterning of individual human development over the life course with the evolution of the socio-political

framework and its multifarious social ecosystems. At its most ambitious, Dimension 4 sees the totality of relations (social ecosystem construction within the wider political economy framework) as ‘social ecosystem time’—a long-term project of sustainable expansion of learning and knowledge production [37].

4. The SEM in Action—Inclusive Place-Based VET in the English Context

The prime function in the English context of this full framework SEM is to assist the movement away from a top-down managerial and marketised education model and towards a more devolved social and place-based approach to VET. The SEM brings into play the ‘living dimension’ [35], that expands the established ‘skills ecosystems’ model [10,87] that has focused more narrowly on supply and demand approaches to work and skills development. This ‘living addition’ has led to the concept of the ‘Working, Living and Learning Nexus’ [37].

‘Working’. Productive activities, as in the skills ecosystem approach, could include building working partnerships between employers, education and training providers and local government to produce a more high-skilled and inclusive local economy, while assisting localities to transition towards net zero [36]. An integral part of the new working partnership dimension would be co-production projects between workplaces, education providers and civic society organisations to stimulate the development of new high-value jobs and to improve skill utilisation at work. Seen this way, the skills ecosystems approach operates fundamentally along the working dimension of the SEM in the ‘middle range’ ecosystem level.

‘Living’. It has become increasingly clear that the ways people live their lives and undertake work are intimately linked, with an increasing focus on sustainable living activities—the development of affordable housing; investing in local transport systems to reduce the impact of the ‘journey to work’; regeneration of the UK’s declining high streets and town centres; improved local health services and the creation of new green and blue spaces, all of which help support a strong local identity [35,88]. The groundbreaking conceptual work of Finegold [11] highlighted the importance of attractive living environments in supporting high skills ecosystem development. The perceived relationship between living and working factors now is developing in differing ways. It has been shown, for example, that high streets and the centres of small towns in the UK become more sustainable when connected with employment taking place in the vicinity [89]. Recently, the ‘Working, Living and Learning Nexus’ finds expression in policies promoting ‘20-Minute Cities’ [90].

‘Learning’. The learning dimension of the SEM is not only focused on the educational development of the learner throughout the life course, but also on supporting the participation of local people in the new local economy and wider civic life. Here, there are challenges of creating not only high-skilled jobs, but also better-quality employment at lower levels, termed the ‘foundational economy’ [91]. At the same time, the living dimension adds to the educative mission by suggesting the need to create city-based life-long learning systems [92] that can enable local people to engage in education throughout their life’s course, prepare for purposeful employment and grasp the opportunity to lead more purposeful and sustainable lives, understood as a ‘life well led’ [93].

5. Future Steps—Transitioning through a ‘Political Economy–Ecology’ Perspective

The social ecosystem model has been constructively critiqued by South African colleagues from Witwatersrand and Rhodes Universities who, while appreciating its potential role in expanding the skills ecosystem approach through the inclusion of the Living dimension, argue that it has ‘an inadequately differentiated theory of emergence’ [80] (p. 572). They suggest what is required is a process of ‘laminated ontological grounding’ arising out of reviews of multiple research studies and national cases [94] that stresses:

‘a strong emphasis on the intersection of social and environmental concerns and the immanent confluence of political-economy-ecology relations that are shaping VET within the wider laminated totality that operates as a ‘functioning social-ecological ecosystem model

for skills. . . reflecting current demands for giving greater attention to the transitioning experiences of learners, changing jobs, livelihoods and work, institutional, and political-economy-ecology or environmental concerns in skills system development' [95] (p. 583).

This critique has given rise to a reformulation of the original social ecosystem model (Figure 1) to create what they term a 'political economy-ecology' perspective of transitioning to more sustainable futures represented by Figure 2.

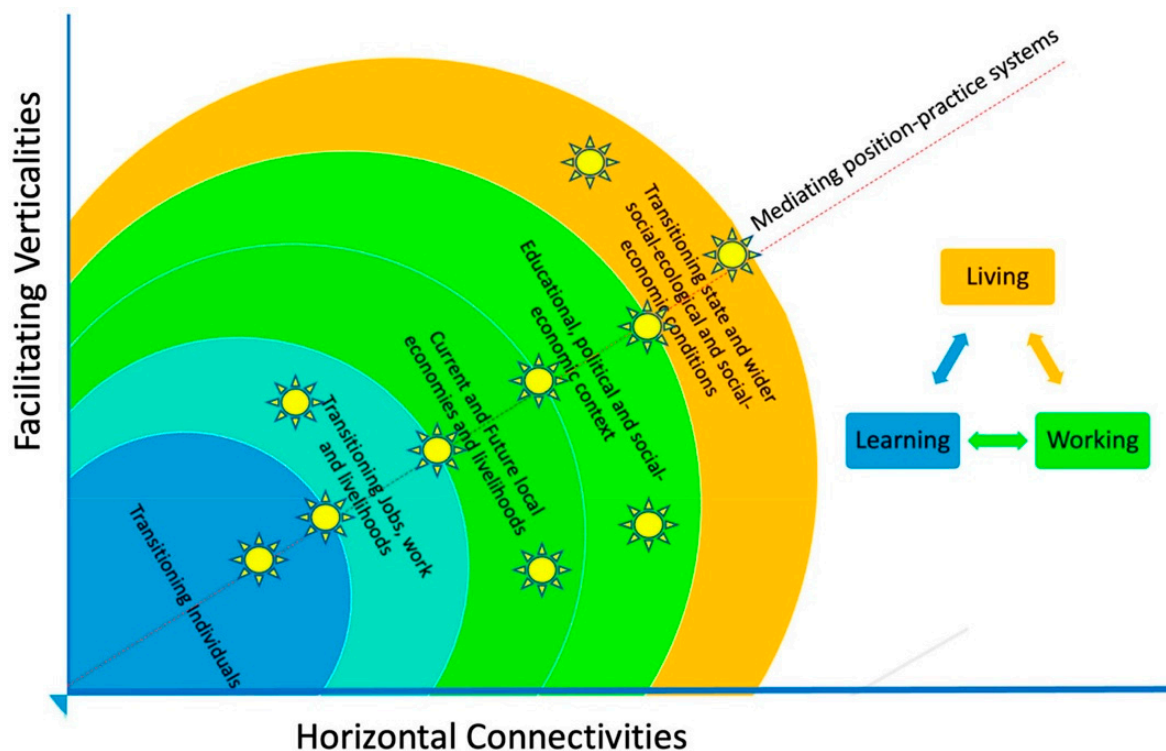


Figure 2. Multiple transitioning across work and societal contexts. Scheme 2022.

It is thus possible to see the recent work of Ramsarup and colleagues of the Africa VET 4.0 Collective, with their focus on sustainability transitioning, as providing a path of social ecosystem development to bring Variant 2 of SESs closer to Variant 1 and even the possibility of a unified SES model.

6. Conclusions—Progressing through Stages of Social Ecosystem Thinking

The development of the social ecosystem model operating within a wider political economy framework is viewed as moving from Stage 2 to Stage 3 of social and human ecological thinking with the largely metaphorical transfer of ecological ideas from the natural to the human world being superseded by a theoretical approach that recognises the complex multi-layered nature of society and the critical roles of ideological, political and economic power in determining sustainable futures.

This contextual emphasis has been deemed necessary to address what is seen as a major weakness in the metaphorical approach to human ecological thinking—network idealism. The movement from Stage 2 to Stage 3 has involved two conceptual steps—the spatial adaptation of Bronfenbrenner's human ecological levels that includes the elements of Finegold's high skills ecosystem work, followed by the placing of this multi-level human ecosystem within a political economy framework. Both parts have been brought together in Figure 1.

This 'expanded' social ecosystem model originating in the English context has stimulated post-anthropogenic thinking in the Global South, witnessed by its critical extension in the South African context as part of an expanded 'political economy ecology' approach to skills development (see Figure 2). These critical revisions suggest that the elaboration

of the social ecosystem model will depend not only on ongoing intellectual reflection, but critically its application in differing societal contexts in search of sustainable and socially just futures.

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