

## Literature Review

“...‘things’ do not have determinate boundaries, properties of meanings apart from their mutual intra-actions [which] calls into question the dualisms of object-subject, knower-known, nature-culture, and word-world.”

Karen Barad (2007, p. 147)

“Nothing exists outside of a relationship to something else”

Apalech scholar Tyson Yunkaporta (2019, p. 169).

“Guided evolution implies normative considerations. The norm, however, is nature, not idiosyncratic human proclivity. It is our challenge to foment individual and collective developmental processes that manifest evolutionary consonance. An action-oriented theory of evolution suggests that human beings have the choice consciously to participate in the co-creation of the future. And yet it seeks neither to predict nor to “socially engineer” the future. Rather, it aims to create the conditions for the emergence of sustainable evolutionary futures...The orientation of proactive evolutionary facilitation is essentially possibilistic.”

Alexander Laszlo (2009 p. 214)

## Introduction

In this literature review I engage with knowledge and theory that inform the design of Complexity Patterning Based Education (ComPatt.Ed.). It is a selective literature review that engages with ideas and praxis that support the design and operationalisation of Complexity Patterning into teaching and learning curriculum and materials. Understanding that emerges from my engagement with the literature is woven into this review. Selected entries from a research progress Journal are also included.

The broad purpose of education is considered first of all. Taking this approach in the first instance forms the broad knowledge conditions for the emergence of ComPatt.Ed. Secondly, the focus narrows to the complexity of teaching and learning. This shift of focus anchors the central complexity concept, relationality, within ComPatt.Ed. It also connects relationality to the purpose of education as described in the previous section. A leading-edge body of work on relational pedagogy by Riddle (2019, 2022), Riddle and Hickey, (2023, 2025), and Hickey and Riddle (2022, 2024), as well as their work with a range of other scholars, forms a reference point for the implementation of ComPatt.Ed., which expresses the intra-active and trans-phenomenal relationality of the deep complexity paradigm.

Relationality is central to all of life. It is fundamental to human evolution as we move from the fixed conceptualisation of individuation within the mechanistic paradigm, into the patterning and nested holarchy of the deep complexity paradigm. In the latter dynamic we are individuating through relational being and engagement across scale. Embodied relational

experience, knowledge and understanding is designed into ComPatt.Ed. in order to contribute to the emergence of consciously co-generative participation in an alive and evolving universe. This experience of relationality based in the dynamic nature of life, aims to entune human beings towards response-ability as custodians of the health and wellbeing of ecosystems, species and societies.

Following on, is a brief engagement with the same educational theorists mentioned above, who also champion teaching and learning based in authentic democracy. Such an educational praxis is an extension of the focus on relationality to include broader social realities and political dynamics. These authors also publish with a range of others. These works form a foundation for ComPatt.Ed. being aligned with beneficent global governance. With the surge of threats to, and even direct dissolution of, democracy in the western world, this aspect of ComPatt.Ed. is imperative.

Then, educational theory and knowledge is engaged, to inform the development of guiding principles for the design and implementation of ComPatt.Ed. modules and materials. Included in this section is work in neuroscience, cognitive science, embodied learning, complexity engaged pedagogy and the importance of story and arts-based creativity. By extension, the educational needs of neurodiverse young people and those defined as 'gifted' are also considered.

After that, the role of trans-disciplinary and post-disciplinary educational design is explored, with a view to informing the metacognitive approach of ComPatt.Ed.

Last of all, a rationale for inclusion of complex time in education is included. This dimension of education is discussed in detail in my previous publication, yet is included here in brief due to its importance within evolution (Ivaldi, 2020, 2023), and the design and implementation of ComPatt.Ed. (Brown, 2023b).

### **The evolutionary purpose of education.**

The overall purpose of education at this time in history is the starting point for this literature review. This central or *tap root* holds the growing and spreading tree patterning of ComPatt.Ed. deep into the ground of life. Connecting to the zeitgeist for purposefully creating the conditions for education to support and enable the evolution of human consciousness, thinking, understanding and action for viable human futures (see Appendix 1).

Education is the main site of learning and skills development for human beings, and as such plays a central role in human evolution towards healthy and peaceful futures (Ellyatt, 2024; Laszlo, 2019; Swanson, 2023; Smitsman et al., 2023a & 2023b; Luksha, 2023). Indigenous scholar Yunkaporta (2019), reminds us that human beings are the youngest species on earth, and that we are still evolving towards becoming fully human. Interestingly, human beings also have a level of agency and creativity that enables novelty and technology. Also, the complex phenomena of our societies are more dynamic, and somewhat more complex, than

ecological phenomena, due to exponential growth together with increasing amounts and complexity of information we generate, as well as the mercurial nature of human culture (Laszlo, 2009). These differences also enable us to become conscious participants in our own evolution, and potentially creative custodians of thriving Earth systems.

Alexander Laszlo describes evolution as,

‘A process of directional (but non-directed) change that leads from states closer to thermodynamic and chemical equilibrium (the so-called first state) to those further removed from it (the “third state”). Evolution = a tendency toward greater *structural complexity* and *organizational simplicity*, more efficient modes of operation, and greater dynamic harmony’ (2009, p. 215, italics in the original).

The capacity to consciously participate in our own evolutionary emergence is particular to the human species according to biologist Martha Manos (Pennisi, 2022; see also the work of Laszlo, 2009, and Smitsman et al. 2020).

Fox and Sheldrake (2014), define human evolution in terms of increasing participative relationality within wider fields of phenomena in the universe. This is a process of experiential extended cognition, thinking-with and being-with, phenomena outside of the bubble of bodily and personality individuation. It may be a process of re-membering the capacity for human transpersonal and transtemporal multidimensionality, through engagement with the holarchy of fractal connectivity.

It is acknowledged that many First Nations peoples had and still have, an understanding of persons and all entities as internally intra-connected multidimensional beings. Times past are active now and all-time is perpetually generative. Everything is kin. Names can reflect this, with one person having several names, each one used in a different relational situation, as the name itself describes the qualities of relationality in that situation (Wilson, personal communication, 2020). With evolution described as a spiral by Fox and Sheldrake, (2014), perhaps re-emergence of this wisdom in the context of current human culture and circumstances is part of a new sweeping arc of evolution for humanity. It is interesting to connect this to the spiral patterning of complex time within ComPatt.Ed.

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*Research Progress Journal Entry. Feb 10 2025*

*I am understanding more and more about the participatory co-creativity of human beings within fields of consciousness, and hence the process of emergence/becoming/evolution. Not as an abstract knowledge, but as an embodied experience of ‘invitation’ to engage with fields of consciousness far more sophisticated than mine. From this experience I am exercising the state of acknowledgement/prayer/praise/love/communion (none of these words quite say it), that is a conscious and active choice my end. This is not wider consciousness communicating with a passive and receptive human. Nor initiated*

determination by me to 'tune in'. It is more like enacting relationality within and across the nested levels of holarchic consciousness and manifestation in the cosmos. A becoming-with.

I'm realising that conscious participation in evolution includes loving attention to/with fields of consciousness, in the same way that loving attention – looking at, listening to, and attending - to children enables their emergence. Ignored children can struggle to thrive.

For many weeks before this started to form in my understanding, the Sun, our precious star, had 'called me' to engage at dawn every day. I've always enjoyed a sunrise when I am up, but this is completely different. I am moved to gaze, eyes squinting, to flood my consciousness with the light and information pouring from the Sun. I let it in with no idea of any specifics, just a warm open joyousness. Let There Be Light. Yet this is not just light as the Sun, but light as a cosmic field, that is focused for us, for our solar system as/with/through the Sun. Is the informational nature of our visible light evolving and changing? It sounds logical.

According to Google, the Sun has its own vibrational frequency, "peak frequency of the Sun is  $f(\text{peak}) = 340 \text{ trillion hertz}$ . They measured the frequencies of these oscillations more and more accurately, and found that the Sun was virtually ringing like a bell. Like a musical instrument, it didn't oscillate at just one frequency, but **at many precise frequencies, called resonances.**" A patterning of resonances?

Is it increasing in intensity? – like the Schumann Resonance – and maybe increasing in complexity? I'm fascinated by this.

Such experiences began in my childhood. As I grew, I questioned them, and at 11 years of age spent many months learning the difference between information generated in my mind, body, or imagination, and information engaging with me like the warmth of the sun on skin, before touching my awareness. Yes, sun-light has been my go-to analogy!

An academic colleague and friend mentioned yesterday that they awoke unusually in the middle of the night, as though pulled awake, and gazed out to see many, many stars in the night sky shining with an unusual and strange brightness, that seemed to fill the entire spaces between them. They went back to sleep eventually, but the experience was unusual enough to leave a strong and lasting impression. (Bork, personal communication, 2025). Interesting that they told me this! I mentioned my impression of our star shining differently recently in a way that I did not really have words to describe.

To help make sense of this I have been reading more about the work of Hildegard Von Bingen, who wrote extensively about the mutual intimacy of relationship between nested fields of consciousness in the cosmos. Her work describes the nature of divinity itself as evolving. So, humans must be active in the evolution of the universe, not just ourselves.

Rupert Sheldrake describes the inherently dignified and sacred role of human beings in this perspective of evolutionary responsibility that is two-way (Fox & Sheldrake, 2014). Not just from the cosmos, 'down' through our solar system, to Gaia, to all species, to humans, and into our evolution as one species...but also from humans, radiating to all species, Gaia, to

*the solar system and on to the cosmos. Our mission is truly sacred, to use Ervin Laszlo's phrase.*

*Indigenous cosmology includes the co-generativity effects of purposeful practices, that attune consciousness, mind, emotions, heart and body in relationality with the becoming of more-than-human phenomena, including the 'field' of an entire species or element. I am reminded of a Cree First Nations woman explaining to me that 'two-spirit' identity can include woman/mountain configuration, not only woman/man. This embodied identification can, I believe, extend to person/field of species/matter/knowledge (perhaps symbolised by a specific totem?). My previous investigations of pattern thinking showed that this understanding is evident in many ancient cultures and patterns were/are used as an active and co-generative interface.*

*So, I'm thinking that Compatt.Ed. is also about using patterning to contribute to coherence on a bigger scale? This is bigger than using Complexity Patterning to see, think, know and act with regard to specific phenomena on earth, this is about consciously agentic participation at a level wider than specific action with our bodies, in our own lives. I'm not sure exactly what this looks like just yet but it is very interesting. I'm sure in a group of students there will be diversity of interest/capacity, such that different students can attune to different patterning aspects, connected/aligned/communing/as the fields of consciousness associated with those aspects/dynamics of phenomena. I need to use a backslash when concepts are fluid and connected in my mind.*

*Research Progress Journal Entry. Feb 19 2025*

*So many thoughts and questions about light and information. As a pattern thinker, our star, I suspect, is in connectivity with billions of stars in our universe. Is our Sun an expression point, in a fractal holograph connectivity? Is the Sun a fractally related holographic expression of another source of light? Rupert Sheldrake considers the Sun a conscious phenomenon, based on it being an expression of a field. There seems to be information streaming through/from it that is not generated within it as such. This sentence does not really describe this, as there is no separation. Sometimes English just isn't enough! Perhaps there is a universe wide informational mycelial web with star and blackhole 'nodes'. Inflow and outflow patternings/concentrations? Indra's web?*

*Postscript. The dawn engagements with the Sun stopped after a few weeks, and it went back to seemingly being a source of light each day in a much more ordinary way. The experience and understanding stays with me. I am reminded of the temporal rhythmicity of all flows of information and energy, matter and meaning.*

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Returning to the literature review. The ComPatt.Ed. design and strategies for the understanding, knowledge, and practical skills of complexity competence is one contribution

to an evolutionary purpose for education. This purpose for education contrasts with the generally accepted purpose of education to reconstitute the dominant cultural and political milieu. At this time in much of the world, this includes the neoliberal corporatisation of learning. Wendy Ellyatt critiques the current focus of education being the individualised and competitive achievement towards unbounded attainment of power and materials, and offers a clear rationale for a wider and more balanced flourishing for all students “Within the context of sustainable and regenerative futures.”(2024, p. 1). In alignment with this perspective, ComPatt.Ed. aims to support thinking and understanding, knowing and becoming, that is attuning and aligning with the health generating dynamics of life. Rather than the currently somewhat destructive human trajectory based in a culture of extraction, exploitation and unbalanced accumulation.

To enact our lives in such a way that brings us into co-creative alignment and mature conscious custodianship of a healthy and thriving planet is described as humanity’s sacred mission (Laszlo, 2024). Reflecting this understanding this current project is a form of evolutionary design within education that seeks to create the conditions for increasing coherence within students’ lives, within the classroom and by extension within society (Laszlo, 2019). The need for education that engages directly with dynamics and attributes of complexity in the world is documented in the work of theorists who connect education and human evolution (Luksha, 2023; Luksha et al., 2018; Luksha & Kisner, 2020; Laszlo, 2019; Smitsman et al., 2020).

Such education is described as transformational (Brown, 2023a). ComPatt.Ed. specifically aims to contribute to human evolution through attuning knowing and being, and teaching and learning, to the generativity of life. A patterning ontology underscores this aim, based in the across scale patterning that is occurring from the subatomic quantum field to the formational patterns of galaxies in the universe and much in between (Diez Faixat, 2021; Laszlo & Laszlo, 2016; Meijer, 2021; Meijer et al., 2021; Müller et al., 2018).

The evolutionary focus in this work is founded within the deep complexity paradigm; within the diffractive relationality of complexity science, Indigenous Knowledge and the quantum field theory work of Barad (2007; see also Brown 2021, 2023a for more detail). Diffraction is a concept developed in the theoretical physics work of Karen Barad, who describes diffraction patterning as the intra-active process of individuated forms coming into being through relational dynamics (Barad, 2007). Barad calls this process structuration (2007), which relates to the concept of the in-forming of life from the implicate to the explicate orders (Bohm, 1980; Currivan, 2023), and is described simply as patterning within a patterning ontology.

This understanding goes beyond the idea of inter-relationality of individuals or parts, to intra-action as the process of relational emergence originally theorised and explained by theoretical physicist Karen Barad (2007). Here this paradigm shifting concept is engaged through a patterning ontology whereby the relational emergence of individualised forms and beings comes about through processes of patterning (Brown 2021; Diez Faixat, 2021; Meijer, 2021; Meijer et al., 2021; Yunkaporta, 2019). A patterning ontology also reflects an Indigenous understanding of life (Sheehan, 2003; Yunkaporta, 2019).

It may be that engaging with patterns as relates to phenomena and to fields may enable capacity for co-generative engagement with this informational flow. Wonderment and delight in the world, are described as necessary for wisdom and as integral to education according to Hermann Hesse (1962), who also found deep meaning in the phenomenon of trees.

This section has formed the fundamental conceptual and theoretical foundation for the development of Complexity Patterning into ComPatt.Ed. From here, this literature review moves into the actualities of teaching and learning, to inform the educational design and materials for implementation.

## Relational Education

Phenomena do not merely mark the epistemological inseparability of observer and observed, or the results of measurements: rather *phenomena* are the *ontological* inseparability of agential intra-acting components. The neologism “intra-action” signifies the mutual constitution of entangled agencies...the notion of intra-action recognizes that distinct agencies do not precede, but rather emerge through, their intra-action...“distinct” agencies are only distinct in a relational, not an absolute, sense.

Karen Barad (2007 p. 33)  
Italics in the original

Relationality is the fundamental reality of the coming-into-being of all of life, and of the dynamics known as complexity. Relationality is the dynamic of manifest emergence, and so it forms a similarly fundamental aspect of the purpose of Complexity Patterning Based Education (ComPatt.Ed). This work moves away from relationship as interaction between fundamentally separate materially bounded *parts*, to a more phenomenal and field based participatory co-becoming that considers individuation as emergent from within relationality (Barad, 2007). In this paradigm people are already participating and co-becoming within any phenomenon of engagement, including the classroom as learning commons (Brown, 2021).

Education for the sole purpose of hyper-individualised competition for singular success at the expense of others and at the expense of the planet, is considered a manifestation of the now outdated mechanistic paradigm. By contrast ComPatt.Ed. is based in participatory and relational learning/becoming emergence. The deep complexity paradigm emphasises the inseparable relationality of all apparent individualising expressions, all individuals and entities.

It is not either/or, one or/the other that is found in dichotomous thinking. It is instead dialectical. Relationality generates individualised expressions from within the vibrations, diffractions, and patterning of/with-in the field, and increasing complexity is emergent from the relationality of individuations as they move and engage, informationally, energetically and materially. Relationality and individuality are mutually co-constitutive. Patterns of flows of information, energy, matter and meaning are endlessly variously configured, generating diverse salience of foreground and background, focus and emphasis. Within the classroom, this enables room for equitable opportunity to excel individually as well as co-generatively.

ComPatt.Ed. is based in relationality, and includes an identity emergence approach, which places being/identity as a dynamic, complex, and broadly relational phenomena. Learning and becoming are considered to be inseparable, with a ComPatt.Ed. based critique of current education being that a superficial emptiness can be created for students when becoming is seen as what happens outside of the classroom, separate from the curricular content. The use of Complexity Patterning here is designed to encourage experience of embodied and embedded identity emergence in a trans-phenomenal and trans-temporal way. Of course, the configurational identity patterning for each student will be unique as well as dynamic.

Embodied relationality is the first complexity concept to be engaged. In the module for Stage 1 – including Kindergarten, and years 1 and 2, relationality is engaged through breath and the tree patterning first of all. Breathing is the most fundamentally relational act that we all engage every second of our lives. The co-mutuality of trees and people breathing forms the foundations of ComPatt.Ed at this level. Relationality is then woven in increasingly sophisticated ways within the development of ComPatt.Ed. throughout the stages of education, in a wide range of ways, and connected to a range of topics.

A central point of this educational design and strategies is the embodied enactment of the complexity concepts. This is not teaching and learning *about* complexity, it is a direct living experience of us all as complex phenomena. Of learning and knowing as complexity-based phenomena also, both within each student and within the learning commons of the classroom (Brown, 2021, 2023a). Which is why embodied relationality with ecological elements is the starting point for ComPatt.Ed.

The works of educational scholars Stewart Riddle and Andrew Hickey provide a strong foundation for relationality within ComPatt.Ed. (Hickey & Riddle, 2022, 2024; Riddle & Hickey, 2023, 2025). These authors centre relational dynamics within the processes of effective and meaningful teaching and learning. Centered on the generative present, emergent moments of encounter are described as the enactment of relational dynamics. The authors provide detail of the conditions for meaningful relationality, such as informality and spontaneity, which are useful in this work for the implementation design of ComPatt.Ed. These scholars express a view of learning and teaching that is complex in nature without using the term directly. It is acknowledged here that Riddle & Hickey draw on the work of Bingham and Sidorkin (2004), work that presents a range of scholarly perspectives on relational education.

Relational encounters between teachers and students, students and students, and everyone and the context of education, are central in the work described above. The authors include the acknowledgement of all influences on the dynamics of teaching and learning, manifest in encounters. Tacit knowing is included, as is the full complexity of embodiment, mind, body and emotions. Wider spheres are mentioned, but the focus remains on the fundamental engagement between people. ComPatt.Ed. begins and continues with relationality on a broader scale; including the person-to-person relationality described by Riddle and Hickey (2023, 2025) *and* extending to the material/discursive spheres of the world around.



Relationality is extended trans-personally, trans-spatially, trans-phenomenally and trans-temporally within ComPatt.Ed. Dynamics in the classroom are engaged as learning commons and are expressed through the spheres and tree patterning. These strategies based in patterning and ecological metaphors are utilised to engage, experience and know relationality.

After patterning the symbiosis of breathing with trees in the Stage 1 teaching and learning modules, Compatt.Ed. develops through relationality with ground, water and light. Relationality with life in many forms is also involved, and becomes increasingly sophisticated, and complex, across the Stages of Education. There are many topics that can grow from the cycles and complexities of these elements.

Relational dynamics are engaged through patterns, through metaphors, and through design details such as colour, texture and form. The nuances of relationality are acknowledged, including the synchronous, asynchronous, generative and degenerative, the antagonistic and contradictory, and the complimentary and syntonous (Alhadeff-Jones, 2017). In this way the paradoxical and indeed complex nature of relationality is embraced. ComPatt.Ed. does not seek to reduce the diversity of dynamics or expression to a false 'positive' but seeks to engage diversity and difference within the generativity of complexity-based coherence. This more nuanced engagement with relational dynamics is designed to be introduced in late Stage 3, the last year of primary education, or Stage 4, the first two years of secondary education, and can be developed further through stage 5 and into senior years in Stage 6.

Riddle and Hickey state that relational dynamics are made absent and irrelevant in many regular classrooms (2023, 2025). In complete agreement, the deep complexity perspective of education places authentic learning as occurring right in the relationality within the 'everything', within all flows of energy, information, matter and meaning. ComPatt.Ed. educational design aims to provide a shared language to acknowledge, include, and engage with these every day, familiar, some subtle and some not so subtle, dynamics.

Relational education cannot be standardised for assessment, and is by nature a recontextualisation of the phenomenon of teaching and learning within the specifics and contingencies of embodied locality (Riddle and Hickey, 2025). ComPatt.Ed. also does not lend itself to standardised testing. It is an expression of the immediate environment of students' embodied experience of being/becoming, the dynamics of classroom and school culture, and the environment both ecological and cultural. Therefore, any assessment would need to be formative and generative, not standardised. It is, however, designed to enhance learning.

Whilst Riddle and Hickey (2025) place learning in the 'gap' between teachers and students, ComPatt.Ed places learning in the dynamic patterning of entangled relationality within and amongst students, teachers, culture, and world, including the materiality of the school and wider environment. It includes time as a complex phenomenon. The question 'what exactly is the relationship of ComPatt.Ed. to Riddle and Hickey's recent body of work?' is answered in response to the authors comment 'We are interested in the possibilities that are opened by the enactment of relational pedagogy in classroom practice, educational policy making and school-community relationships...' (Riddle & Hickey, 2025, p. 16). Compatt.Ed. is one

possibility, one approach to engaging and enacting relational pedagogy. ComPatt.Ed. is designed for curriculum content to be enacted through relational, complexity-based metacognition. It bridges and integrates complex relationality and curriculum.

Riddle and Hickey also look at the presence and prevalence of relational concepts and language in educational policy and guidelines for educators in the Australian education system (2023, 2025). They consider and investigate how these relate to what is actually happening in classrooms and in practice. The authors illuminate the use of the term relationality as unfortunately sometimes an 'empty and sliding signifier', which can then be used in service of the hegemonic educational paradigm, to control students and their communication, to support market-based conceptualisations of academic achievement and to emphasise hierarchies of power. This reduces and simplifies the complexity and plurality of dynamics and constrains the emergent generativity of authentic relationality.

The works of these authors are of great interest to me, and serve to remind me to take great care that ComPatt.Ed. is not co-opted in the same way. There is literature describing how systems knowledge has been co-opted to serve a big data-based approach to prediction and control of phenomena (see for example, Morin, 2007), rather than focusing on the full complexity and real time generativity expressed within the deep complexity paradigm.

The literature engaged in this section indicates to me that educators need the support of explicitly relational educational design. They need scaffolded professional support enabling familiarity and confidence; ComPatt.Ed. needs to be easy to teach.

At the same time, it is acknowledged that the material provided within ComPatt.Ed. may challenge educators to evolve their understanding of both complexity and relationality. It is my firm belief that this shift to a new educational paradigm is already emerging, with the unfolding of Complexity Patterning over many years, and connectivity to the recent body of work engaged here as clear indicators. Educators at this time in history are in a position to contribute in the shift from education in service of a transactional and exploitative engagement with our world to embodied experience of reciprocal relational living.

I have also engaged with an article in Riddle & Hickey's references. Aspelin (2023) proposes a method to investigate teacher/student relationality in the classroom. The author engages with the words, body language and other small actions that constitute relational exchange. This immediately indicated to me that Complexity Patterning is also a way to investigate the relationality in classrooms. It has already been used in this capacity. The design details of lines, colours, textures and of course ecological metaphors, are all patterning denotations of the experienced quality of dynamics occurring in any moment. This includes the effects of verbal communication as well as more subtle currents and flows of energy, information, matter and meaning, in terms of a range of enablement and constraint. Such a feedback loop of information enhances the potential for coherence in the learning environment.

A Complexity Patterning approach to relational awareness can include the tacit dimension of knowing that is sometimes more than we can articulate in direct terms (Polyani, 1966). Patterns, metaphors and analogies can be useful for communicating such knowing and understanding. Complexity Patterning used this way also moves the learning commons

culture of the classroom to being everyone's participatory responsibility. It may also be that different students can express diverse ways of knowing through relating to specific dimensions and aspects of Complexity Patterning, thereby bringing their creative contributions to the knowledge commons.

Aspelin acknowledges the complexity of teaching and learning, in the layers of dynamics occurring between people (2023). They also describe much of it as implicit and as occurring 'underneath' the level of the teaching process awareness (2023), and adds that increasing awareness of the more subtle dynamics that form the fabric of relationality in classrooms is needed. The Compatt.Ed. approach engages directly with a *wider bandwidth* of dynamics occurring than may be usually attended to. Indeed, this was the original motivation for implementing the design with secondary students. It is an approach and strategy for engaging consciously with the 'everything' occurring on many levels, both within our own bodies and lives, our intuition and perception, as well as in the classroom and in relation with the spheres of the wider world. Complexity Patterning enables this engagement with no new or technical language, no psychological language, or educational management language. Such an approach also includes differences in embodied perception of dynamics, which may be particularly useful for neurodiverse young people, for highly sensitive students, and those that may be categorised as gifted. Engaging with complex phenomena begins with engaging the complexity we are immediately within and familiar with. Using the language of Complexity Patterning enables and facilitates this process.

Both a consciously participative approach to human evolution through education, and relational pedagogy are based on the expression and enactment of *what matters* to people. Barad explains the intra-actional dynamics of life's coming-into-being as flows and ebbs of information, energy, matter and meaning (2007). Their use of the word *meaning* includes the interests and motivations of all species, of all life on earth (Barad, 2007). As culturally mediated creatures, human beings generate meaning that is more than biological motivations. Barad's extensive body of work purposefully integrates the term *mattering* as the ongoing emergence of the material world, and *mattering* as the ethico-onto-epistemological co-generative participation of human theorising, knowledge making and action (2007).

Ethics and discursive considerations are always already aspects of any complex phenomena in Barad's perspective of quantum field theory (2007). ComPatt.Ed describes relationality in terms of the many levelled flows and exchanges of energy, information, matter and meaning within phenomena (Brown, 2021, 2023a). In this way, meaning is anchored in relational dynamics as *mattering*, through what and who matters, in what way, to whom, and how this is enacted and experienced (Brabazon, 2024), as well as in the world making perspective described in Barad's works (2007).

Ebbs and flows of information, information and matter are reasonably easy to express with Complexity Patterning. Meaning can also be engaged and explored by using the patterning and metaphor design elements to visually express *what matters* and *the way that it matters* to people, and by extension the effects this may have on our actions, on the flows of information, energy and matter we generate and co-generate.

This aspect of ComPatt.Ed is of great importance at this time when declaring that ‘nothing matters’ is increasingly prevalent (Brabazon, 2024). Brabazon clarifies that “Mattering networks are the psychological construction that is inside all relational dynamics.” (2024). People experiencing their lives as mattering or not is strongly connected to suicide rates, with mattering itself a “Proxy for resilience.” (Brabazon, 2024).

Mattering is very intimately entangled with our experience of time. As described further in this review, the experience that we have ‘run out of time’, that things are a ‘waste of time’, can affect our sense of the meaning of our existence in a very fundamental way. Brabazon also makes the connection that when people lose themselves in time, they can experience that they ‘don’t matter.’ (2024). Considering the threats to democracy and freedoms of all kinds, and increasing violence in the world, the experience of relationship and mattering are of great importance within education, as well as generally. On a fundamental level ComPatt.Ed. also aims to support student well-being.

The emphasis with ComPatt.Ed on healthy identity emergence, together with the generativity of the learning commons of the classroom culture and relationality as the ground state, offers an approach to including meaning and mattering in education. This forms a foundation for topics and activities based in explicit engagement with ethics, values and culture of all kinds including personal relationships, politics and economics. As Laszlo and Laszlo state, “to look at development from an evolutionary perspective involves making explicit and embracing the values, perspectives, assumptions, and knowledge required to move human societal systems to an ethical social innovation phase.” (2002, p. 409). The co-generative, mattering, and communication-based learning commons within ComPatt.Ed. can provide a foundation for complexity-based conflict resolution skills experience in late primary and secondary education.

## Education for Democracy

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*Research Progress Journal Entry 21 January 2025*

*The reductionist narrowing of teaching and learning occurring under current neoliberal policies and pressures is sharply contrasted with relational education as expressed by Riddle & Hickey (2023, 2025). As I am writing these words on what is 20 January in the USA, I sadly anticipate that neoliberalism in education will intensify in the US and subsequently here in Australia, perhaps to the point of being fascist in nature. I am aware of increasing numbers of books being banned in the USA, a tightening of history curriculum to colonial imperialist propaganda only, and any respect for diversity and equity being removed altogether. Arresting the diversification and creative complexification of life, (Calderaro, 2025) surely also arrests emergent evolution, or at least attempts to. As I observe it, here in Australia, similar political forces are emboldened and awakened by the USA situation. It is a strange*

*juxtaposition to be bringing radically relational educational design to the world at this time. Perhaps it is perfect timing, perhaps it is exactly what is needed.*

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In early 2025 we are entering a time of increasingly extreme right-wing political forces coming to power. The ramifications of this do not need to be detailed in this literature review, but these circumstances increase the imperative for authentic and ethical democracy, and for epistemic and social justice, to be purposefully incorporated into educational design. Cooperation across diversity, and equity of access to education, become increasingly important social and political aspects of complexity-based education. Diversity is one of the attractors of increasing complexity to another level of emergent organisation within many phenomena.

Stewart Riddle (2022) states that there needs to be a radical reimagining of the purpose of education for generating social good. As mentioned earlier, this contrasts with the current purpose of education as strengthening elite hegemonic control of resources in the hands of a few, who also have deciding power over others' lives and the state of the planet.

At this time of great change and upheaval, education can assist us to move beyond recreating existing social inequities. Understanding the nature of complex phenomena, includes evolution through increasing diversity and redundancy, with healthy relationality facilitating emergence to a level of increasing complexity and coherence. Riddle acknowledges the complex nature of a democratisation of education (2022), and this connectivity places ComPatt.Ed. to be a useful approach to knowing, understanding, and embodied experience towards engaging with the common good. Teaching and learning itself is conceptualised as a dialectical co-emergence of individual and commons, with this dynamic relationality expressed through the language of Complexity Patterning. This mutuality is illustrated by Riddle (2022), through a quote from educational theorist John Dewey "Each has to refer his own action to that of others and to consider the action of others to give point and direction to his own." (1916, p.101). This is an understanding that connects with Barad's intra-action as the relational foundation of all individuation (2007).

Riddle rightly explains that facilitating an ethically democratic classroom is something that requires the participation and cooperation of all students (2022). Introducing relationality and participation in co-mutuality from stage 1 of formal education through ComPatt.Ed. provides a foundation for beginning from within conscious and respectful relationality, then moving into the more specific and disciplinary framework of democracy and politics, civic life and governance, all connected to the health of societies and ecosystems, during later educational stages. It is learning that forms an experiential foundation of beneficent governance. David Chalmers describes at length the need for community, regional and global governance that is based on the truth of life's complexity (2014). Whilst Chalmers places the concept of resilience as a way to engage complexity, the deep complexity paradigm places complexity competence as a way to enable the preferred concepts of thriving and flourishing. Resilience is a term that has been misused to denote continuation

of violated and dominated groups and ecologies in contexts of continued struggle. Resilience doesn't necessarily equate to flourishing.

An authentically democratically based education is not in opposition with healthy individualism. Here Riddle and I agree, that emergence of the complex potential of healthy individual expression is antithetical to the reductionism of the conformist approach of the neoliberal, market/corporate/commodified and mass individualism that is a form of coerced if not violent suppression towards homogenisation (2022). A Compatt.Ed. approach to education places individual emergence within a complexity understanding of diversity, dynamic multilevel emergence and evolution within one lifetime, as well as generally.

Authentic democratic education aims to be a living practice of relational pedagogy, and Compatt.Ed. provides teaching and learning design and strategies to support its emergence. This is because ComPatt.Ed. does not use one ideological discourse to critique another, it rather uses the concepts and dynamics of complex phenomena as a fundamental reference point for critical analysis of all and any humanly constructed systems. Concepts such as, far from equilibrium, coherence for health, feedback loops, indeterminacy, probabilities, perpetual emergence, bifurcation and change may all support the experience and knowledge of democracy in the classroom. All founded on a depth of complexity experience and understanding developing throughout the stages of education using the language of patterns and ecological metaphors.

In the early stages of education, engaging explicitly with the relational experience of the classroom commons provides the basis for developing participation in socially equitable culture. When all students experience participation in the flows and qualities of dynamics and relationship occurring, and are provided with a simple language and strategies for engaging, classroom culture can be as democratic as possible. As a secondary teacher I explained to my students that I was employed to be responsible for their learning progress and as such had knowledge that they may not yet have, but otherwise we were all learning together.

Increasingly sophisticated use of ComPatt.Ed. is a strategy for including social and environmental justice within education. This educational approach has community relationality as core ethics (Riddle and Cleaver 2017). Within this approach there is a lot of room available for classroom dynamics to be engaged through an inclusive, fair and communicative approach. Each student can be encouraged to understand their strengths, power dynamics can be purposefully engaged, mediated and balanced, and leadership can be a mutual and changing configuration. ComPatt.Ed. provides a patterns-based language and strategy for enabling such a democratic approach to education.

A true and ethical democratic educational approach is a form of the participatory ethic of 'being in relation' according to Riddle and Hickey (2025). Compatt.Ed. is designed for this purpose. It offers a metacognitive and post-disciplinary approach that adds complexity knowledge to any other topic or subject. ComPatt.Ed. enhances topics by opening thinking and understanding to plurality, the unseen, indeterminacy, and the systemic and discursive arrangements involved. In this way ComPatt.Ed. develops into a complexity based critical

thinking and analysis strategy. It can also be used to consider and design alternative arrangements, as a strategy for futures thinking.

The Club of Rome reminds us that Democracy can be diversely expressed in different cultures (2021). A complexity perspective supports understanding of diversity and plurality as inherent within healthy and coherent phenomena. Global governance of peaceful international relations and resource distribution, for human and more-than-human health and wellbeing, requires purposeful inclusion, cooperation, collaboration and a practical ethics of care. When classrooms are operating this way, through using ComPatt.Ed., students can experience their learning within a culture of democratic participation and social justice.

From here, this review engages with other considerations for education in the twenty first century.

## **Educational Design**

Compatt.Ed. is a biophilic educational design. This spans from the design itself being based in ecological pattern flowforms and the use of ecological metaphors, through beginning with engagement with and learning-with the fundamental elements of air, water, ground and energy needed for all of life to continue to learn and thrive. ComPatt.Ed engages with the students in the classroom as a learning ecology that is relationally inseparable from the more-than-human life and complex phenomena all around. As ComPatt.Ed. develops in sophistication across the stages of education, the connectedness of people and cultural life with all ecological phenomena continues to be expressed. The partnership of people/planet underscores all modules.

It is also an approach that engages directly with the life force, the motivation to become, of the students, and doesn't seek to compromise their developmental complexity. Instead ComPatt.Ed. engages students *through* their complexity, and offers an educational approach of agentic participation and authentic relationality. Experiencing themselves as complex phenomena first of all builds embodied knowledge of people and culture as expressions of life's creativity.

The work of Global Education Futures (GEF) informs the overall design of ComPatt.Ed. (GEF, 2020). The GEF group recommends cultivating the knowledge and understanding of interconnectedness and complexity thinking, experiential learning, collaborative learning, self-awareness, critical thinking and decolonising perspectives, as well as creative approaches with transformative storying, problem solving and a joyful approach (GEF, 2023).

ComPatt.Ed. uses Complexity Patterning as a language and strategy to think-with, engage, and relate to learning, life and the world. The spheres and spiral patterns are especially suited for use as critical complexity thinking strategies, with tree and seed patterns contributing another level of thinking-with strategies. Using patterns in this way supports both embodied learning that is connected to personal becoming/emergence and the

learning/becoming commons of the classroom. It is also an approach to learning as an expression of extended cognition, which is a perspective based in multidimensional fields of life/consciousness.

ComPatt.Ed. educational design is an embodied approach to learning. Enriching students' self-awareness and proprioception goes hand in hand with relational learning and becoming with the world around us. In this way the ComPatt.Ed. design is in alignment with recent literature on embodied learning and extended cognition.

## **Embodied Learning and Extended Cognition**

Pedagogical and andragogical knowledge is moving away from the myths of mind as machine/switchboard/computer, or even mind as muscle (Paul, 2022). The extreme individualisation of neoliberal concepts of learning are also being overwritten with understanding that all individual learning is embedded in relationally dynamic complexity. This aligns with knowledge that conceptualises consciousness as a field-based phenomenon, patterning into the particularity of individualised embodiment.

Knowing that engages with fields of information, energy and meaning, begins with teaching and learning *with* rather than *about* the world. Paul (2022), highlights that intelligence is not a fixed capacity but is dynamic and dependent on the skills of using resources outside of the brain. This perspective aligns with Barad's quantum field theory work that describes persons and world as co-generative (2007). ComPatt.Ed. is being designed to enable *thinking-with* and *thinking-as* the world around, in constructive and creative ways.

Paul's view places cognition as embodied, situated, and also distributed (2022). Theorists Thompson and Varela (2001), also place cognition, and therefore learning, as inherently embodied, whilst Maturana and Varela (1980), introduced the concept of cognition as distributed in our embodied relationality with the world around us, a perspective that was built upon by Thompson and Varela (2001), and Clark and Chalmers (1998). These views are expressed through the deep complexity paradigm, that describes body, mind and cognition as broadly relational phenomena, described through the concept of an 8E octad of relationality: *embodied, embedded, entangled, emergent, extended, enacted, and mutually engaging, all creating effects* in the world. The 8E octad provides concepts for the bridging of theory into teaching and learning practice.

ComPatt.Ed. proceeds from the deep complexity perspective of inseparability of people and world, with relationality the ground state preceding individuation, reflecting the quantum field physics work of Barad (2007). Barad also describes theorising and concept generating as entangled co-generative elements in the world making relationality of people with/in phenomena (2007). Barad's agential realism emphasises the agentic nature of materiality, considering it all as active and involved in a range of ways, rather than as the inert backdrop envisaged by positivist ontologies. Clark & Chalmers (1998) describe the environment as driving cognitive processes; a very agentic view of the phenomena. Interestingly this deep relationality is described by these authors as inherent to human evolution, suggesting that



*thinking-with, learning-with, and becoming-with*, the world of complex phenomena enables human evolution.

In contrast, attempting to reduce cognition to a 'black box' inside a learner's head is described by Fredrickson as a block to learning (2020). Drawing on Dewey, Fredrickson emphasises the biosocial nature of learning (see also Haraway, 2003, 2010; Ingold & Palsson, 2013), that is connected to the continual and ongoing dynamic of becoming. Without using the word complexity, Fredrickson describes learning/becoming as full of unpredictability, and that in an ever-changing world young people need the capacity to understand themselves and their world in terms of dynamic change, of discomfort in the process of new learning and becoming (2020). Interestingly Fredrickson (2020), also suggests a spheres approach to introducing broadly relational becoming to students. Paul's work also considers nested arenas of relational and distributed cognition (2022).

A deep complexity perspective places embodied learning as inseparable from dynamic becoming (Brown, 2021). This is expressed as an identity emergence approach to learning, by using the spheres, tree, spiral and seed patterning to include context across space and time as inseparable from being, becoming and learning (Brown, 2023a, 2023b). It is an approach that engages with time as a complex phenomenon (Brown, 2023b). Theorists Varela (1997) and Varela, Thompson and Rosch (1991) also state that cognition is expressed through identity, which cannot be thought of as independent. ComPatt.Ed. conceptualises identity as itself a complex phenomenon, and central to engaging with person/world mutuality.

The four dimensions of Complexity Patterning, spheres, spiral, tree and seed patterns are strategies for enabling embodied learning and extended cognition. They can be adapted to *thinking-with* various phenomena and various aspects of phenomena from the broadest to the most specific. Thinking with the world, and with phenomena through ComPatt.Ed. is a relational approach that also aligns with ecological or environmentally focused education. The use of ecological patterns and metaphors, as well the fundamental elements of air, energy, water and trees that form the Stage 1 modules, connects ComPatt.Ed to early environmental education. This alignment deserves further exploration.

## **Neuroscience and Psychology**

This section provides a brief overview of some recent perspectives in neuroscience and psychology that are pertinent for ComPatt.Ed. The non-traditional research output (NTRO) of a 2024 Special Issue of the journal *Scientific American* was engaged as a doorway to the latest work of several neuroscientists and other scholars. The Issue is focused on neurodiversity, with leading edge articles on cognition and learning.

The field of neurodiversity is emerging at a great rate. The complex diversity of young peoples' characteristics and capacities is beginning to be considered. Previously this diversity was not captured by the psychological model of neurodiversity as pathology, together with the generalisations of examples from a narrow cohort of males. Importantly, Complexity Patterning was originally implemented for engaging with the '*everything*' that is

the complexity within the teaching and learning experience, *and* to provide a meta level of engagement for the neurodiverse and gifted students in my classroom. As a neurodiverse person myself I originally intended my doctoral research to focus on the intersubjective position of gifted and neurodiverse students. The research expanded to all students and education generally. I would like to focus on this group of students at some time in the future, and will include specific considerations and suggestions for this group within the teaching and learning modules. In the meantime, considerations within neuroscience and psychology of a more general in nature are engaged here.

Neuroscience mostly engages with cognition as contained within the brain, and is only beginning to engage with the complexity of brain/body/world inseparability (Bertolero & Bassett, 2024). Even so, there are points of interest within this field of study for this current project.

The human brain and its capacity for cognition and the expression of consciousness is considered to be the most complex phenomenon in the known universe (Bertolero & Bassett, 2024). Recent views in neuroscience suggest that each person perceives and experiences a somewhat different configuration of the patterning of information, energy, matter and meaning around them (Seth, 2024). The author also suggests that this relates to differences in our sense of identity and self (2024). This perspective connects with the design adaptability of Complexity Patterning to express a very wide range of configurational being, relating to the capacities, interest, and the focus of individuals and groups of students. Bertolero and Bassett (2024), emphasise the flexibility of brain pathways, and state that increasing flexibility supports good mental health. This point suggests that using a patterning approach to knowledge may have the effect of stimulating new neural pathways. This effect was mentioned in feedback from a university student in a Complexity Patterning workshop who said “I can see how someone could make a life's work around this. You opened quite a few neural pathways.” (Brown, 2023a).

The foundation of self as a complex phenomenon within ComPatt.Ed. expresses the deep complexity paradigm perspective of human insuperability and agency within all phenomena we engage. This approach also draws on the interest young people have in understanding themselves and their place in the world. Learning and memory are more effective when students are engaging information related to themselves (Martone, 2024). Researchers Yoon, Goh and Zang (2019), found that familiar and known phenomena were the most effective for the teaching and learning of complexity concepts. There is nothing more familiar and of interest for young people than themselves and their place in the world.

What were once thought of as fixed personality traits are now considered to be dynamically responsive to experience (Russo, 2024). This development indicates that inseparability of persons and world is entering the world of psychology. Identity and self-concept are also considered to be both flexible and dynamic, with processes based in memory that maintain a core self over time (Martone, 2024). Martone describes how our experience of time is directly involved in the contribution of memory to a stable identity (2024). This information engages directly with the ComPatt.Ed. approach to identity emergence based in engagement with time as a complex phenomenon. More detail is included about this dimension of ComPatt.Ed. in a following section below.

With regard to learning, psychologist Camilla Griffiths (2024), details the efficacy of agentic feedback rather than praise or indications of a less than praiseworthy academic performance. ComPatt.Ed. offers learning feedback as connected to the use of Complexity Patterning for engagement with content. Information we may not have considered, included, or is indeterminate at the time, can be 'seen' within the patterning, providing 'feedback' that is inherent within the immediacy of teaching and learning. This style of feedback also engages with a futures approach to learning.

Questions that open the possibilities of alternative information, diverse perspectives and choice of options emerge from engaging with the patterning-based approach to complexity. This is feedback emerging from the knowledge generation process itself, that can be expressed by the students themselves, and doesn't always need to be offered by the teacher. In this way complexity-based feedback processes, support a democratic and respectful knowledge generation approach.

On a very fundamental level, the use of 'mental maps' is shown to improve a range of non-spatial learning capacities (Willingham, 2024). Complexity Patterning has shown efficacy for providing a creatively visual and spatial educational strategy that supports learning and knowledge creation (Brown, 2021). Of course, many cultures throughout history have and continue to use pattern-based 'mapping' and knowledge generation strategies (Brown, 2021).

### **Story and Storying**

Narrative learning is a powerful educational strategy. ComPatt.Ed. teaching and learning modules include narrative activities such as storying. Storying is not creative writing, it is a way of knowing and expressing embodied relationality and agency (Phillips and Bunda, 2018). It is a meaning making strategy that aligns with learning and becoming. Such teaching and learning activities promote equity of voice and expression in the classroom, and also support relationship with the more-than-human world. Mature students can connect story to discourse and strengthen their critical complexity understanding of the construction and emergence of knowledge. Whilst futures as a subject is not included in this Literature Review specifically, storying is purposefully engaged as a futures creative approach within ComPatt.Ed.

### **Art Based Learning**

Arts based learning has grown beyond the notion of simply making art, or learning about the art that others have made. Recent research places art making practices as processes of educational activism, opening opportunity for meaning making that is empowering and potentially transformative (Lasczick et al, 2025). These authors draw on extensive literature into the effective use of arts-based practice for understanding social and environmental relationality and justice (Lasczick et al 2025). As a visual patterns-based approach ComPatt.Ed. closely relates to arts-based practices. Students using Complexity Patterning

have shown visual creativity in a number of ways (Brown, 2021). Within the ComPatt.Ed. teaching and learning modules there is a range of arts-based activities and suggestions.

### **Interdisciplinary, trans-disciplinary, and real world and project learning**

Based on engagement with the UNESCO Sustainable Development Goals (SDG's), Bates and colleagues (2022), identify competencies required to realise these goals. For tackling real-world challenges and problems the authors describe the four main meta-competencies that are required. These are: intrapersonal competence (knowing oneself), interpersonal competence (relational skills and capacities), domain specific skills (specialised knowledges), and normative competence (sound ethical and moral judgement). This last competency includes the need for an ethic of care with ourselves, each other and the world around us (Barlett et al., 2020). The research also emphasises the need for education based in real world challenges, which are characterised by complexity (Bates et al., 2022). Ellyatt (2022) includes the UN Inner Development Goals (IDG's) within her Flourish Model. These are capacities and skills that support engagement and realisation of the SDG's. All of these capacities and skills are woven through the ComPatt.Ed. teaching and learning practices and strategies.

Such education demands an interdisciplinary and transdisciplinary approach to knowledge and action, as well as specialised knowledges (Bates et al., 2022). Addressing real world challenges is itself a complex undertaking. Project design and management requires a complexity-based approach (Brown, 2021). Areas of endeavour such as conflict resolution are also by nature complex (Coleman, 2018).

ComPatt.Ed. provides a broadly transdisciplinary approach to education through its post-disciplinary emergence. This simply means that Complexity Patterning was designed to engage purposefully and respond to complex phenomena, and did not originate as a way of engaging with any particular discipline or knowledge. This meta-level of knowledge is now being designed to enable complexity focused engagement with specialised and disciplinary knowledges, whilst still maintaining its meta-cognitive character.

### **Thinking-with time**

Esteemed scholar Tara Brabazon describes our experience of time as intimately interwoven with our sense of mattering (2024). How things matter, how people matter, and how we matter, are inseparable from how time is experienced and engaged (Brabazon, 2024). Complexity Patterning based education includes the experience of human existence and becoming as a temporal phenomenon.

Based on this foundation, the identity emergence approach of ComPatt.Ed. is connected to the teaching and learning of time as an experienced complex phenomenon. Thinking with complex time is a particularly fundamental and broad way of thinking-with the world. It is something that is ignored within the industrial paradigm of linear mechanistic time that dominates education, to the peril of student wellbeing (Alhadeff-Jones 2017; Brown 2023b).

Engaging with time as a complex phenomenon is part of embodied and extended cognition, as well as identity emergence as a complex phenomenon. This includes engaging with the both the accumulative wisdom and trauma of past generations, and exploring the archetypal and transtemporal aspects we may be expressing individually and as a group.

Thinking-with time is a central aspect of futures thinking and futures co-generative actions (Barad, 2010). Futures based education has not specifically been included in this literature review. It is engaged in previously published works (Brown, 2021, 2023b), and will of course be interwoven throughout the ComPatt.Ed. teaching and learning modules.

## **Conclusion**

Education is vital, as the future of humanity and indeed the planet depends on it (Club of Rome, 2021). The most pressing issue is how education is organised in relation to current circumstances (Giesecke & Schartinger, 2024). There is no doubt that today's educators have a huge responsibility to support and enable students to shape a future where the essential conditions for life support the health of all species (Brown, 2021, 2023a; Giesecke & Schartinger, 2024).

There will always be paradox and contradiction in the complexity of human/world relationality. Moving away from the failed attempt to predict and control life, and engaging creatively with the generative potential of complexity dynamics aligns with the far from equilibrium nature of complex phenomena. Coherence and balance are also inherent within the paradox, with a balance towards health and thriving the goal. Milbrath states that what people need to develop for a sustainable society is literacy, numeracy and ecolacy, or ecoliteracy. With the last as "a working understanding of the complexity of the world . . . a habit of mind that features more respect for nature's intricacies." (1989, p. 20, in Buendia & Morales, 2003, p. 562). The Club of Rome (2021), states that complexity thinking and understanding has not been included in education in the last few decades. It is time for deep complexity-based education, through ComPatt.Ed.

Educational innovation is required, to support creativity and innovation generally in the world. ComPatt.Ed. is one approach to such innovation, offering a meta-cognitive level teaching and learning approach that can partner with any curriculum. To be effective ComPatt.Ed. needs to take educators into account, as they will be learning the approach as well. Educators are inundated with increasing curriculum content and new requirements. This project aims to make the materials and handbooks easy to engage and implement.

I am not claiming that any one classroom or school can solve all of the current issues that the students experience now and ahead, but turning to face them through a complexity-based teaching and learning practice can assist us all to "to generate more relevantly responsive emergent educational futures." (Chappell et al., 2024, p. 3).

The Educational Principles and teaching and learning design guidelines below are build connection between the knowledge presented in this literature review and the teaching and learning practice of ComPatt.Ed.

## **Broad Educational Principles for ComPatt.Ed.**

- 1. Supports conditions for education based in the deep complexity paradigm.** Provides educators with a foundation and strategies for implementing ComPatt.Ed. The educational design supports educators to enable generative relationality in a range of configurations in their classrooms. This principle includes the ethics and values of a ComPatt.Ed. approach, respect, inclusion, collaboration (which includes self-knowledge, communication and conflict resolution).
- 2. Serves and Enables Social Justice and Democracy.** ComPatt.Ed. is education designed to serve the public good, and contribute to human evolution towards healthy futures.
- 3. Is Based in Relational and Embodied Learning.** Beginning and continuing with an embodied and experiential approach to learning and knowledge. Based in relationship, context and contingencies as well as generalisations.
- 4. Engages with Extended Cognition.** ComPatt.Ed. engages the latest understanding of both embodied and extended cognition, to be based in a becoming-with, and thinking-with approach to learning.
- 5. Is an Identity Emergence approach to learning.** This relates to the mutual co-generativity of individual, community, and world, which includes the learning commons of the classroom, community and society, and ecologies all around. This principle honours the integration of becoming and learning, based in both self-knowledge and general knowledge as a relational phenomenon.
- 6. Is both General and Specific.** General enough to provide a foundation for broad complexity competence, and open/adaptable enough to be anchored in the specificities of each student's life and experience, and the context of each classroom/school.
- 7. Emphasises an interdisciplinary and transdisciplinary approach to learning.** Complexity competence is an overarching meta-competency, that within ComPatt.Ed. includes intra-personal competency (knowing self), intra-personal competency (engagement with others), and phenomena competency (engaging with complex phenomena).
- 8. Enables Generative Emergence.** The work enables conditions for and provide opportunities for creativity and innovation. Is flexible enough to partner with curriculum content of all kinds.

## **ComPatt.Ed Teaching and Learning Design Guidelines (not in order of importance)**

- 1. Begins with the familiar and known**
- 2. Complexity concepts connect throughout the Stages of Education**
- 3. Some topics connect throughout the Stages**
- 4. Supports creativity and innovation**

5. Connects science to relationality
6. Engages a complexity of knowledges and ways of knowing
7. Engages story and arts-based education
8. Supports critical complexity thinking
9. Engages a futures perspective
10. Supports extension learning for gifted students
11. Supports learning for neurodiverse students

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# Appendix 1

