

Semiosis, hybridity and the mediated mind (1st)

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Semiosis, hybridity and the mediated mind.

Dr Lee Hazeldine and Aron Spall

Abstract

Knowledge within the digital age is increasingly perceived as being connected, decentred and interactive; consequently, knowledge becomes less about 'simple and durable "truths"' and more about our ability to 'manage complex and rapidly changing environments (Downes 2012). This move from self-present understanding to dynamic rhizomatic knowledge production challenges established representational epistemologies, in which knowledge is restricted along convergent pathways increasingly incompatible within a globalized society. In contrast, emergentist pedagogies provide 'singular processes of learning' (Deleuze, 1994) that insist 'knowledge is neither a representation of something more 'real' than itself, nor an 'object' that can be transferred from one place to the next', rather it emerges during participation in the world (Osberg / Biesta 2008). This chapter highlights how the field of Edusemiotics offers an effective approach to learning within an emergent conception of knowledge; by perceiving learning as *semiosis*, a process whereby meaning is always already mediated by signs, it expands boundaries of cognition beyond dualistic cartesian schemas, generating an image of thought that allows us to realise new potential for education within the 21st Century (Deely & Semetsky 2017).

Introduction

Rhizomatic learning poses a challenge to traditional modes of thinking by encouraging students to adopt an unrestricted, creative and hybrid approach to learning (Cormier, 2008). Unlike traditional approaches to learning that appeal to reified, self-present knowledge, rhizomatic learning advocates the making of new learning connections, concepts and meanings outside prescribed realms of knowledge. Rhizomatic learning is perceived as being increasingly compatible with the needs of a contemporary globalised digital society in which we are moving from an 'age of enlightenment', with its discrete silos of thought, to an 'age of entanglement' (Oxman 2016) in which knowledge moves beyond boundaries, becoming entangled in new transdisciplinary ways when faced with rapidly changing contexts and intersections within the world. Such an approach to education requires new means and methods to understand decentred, divergent and hybrid learning beyond traditional pedagogic accounts that continue to view students as passive disembodied rationalities. By perceiving learning as *semiosis*, edusemiotics might provide such a means and method. Edusemiotics conceives meaning making as constituted through the mediation of difference within signs in a continuous process in which new knowledge is created without resorting to established conceptual frameworks. As such, it provides a strategy to equip learners with a sense of agency in both knowledge creation and self-transformation which are essential for living and learning within an increasingly hybrid and transdisciplinary age; this is especially pertinent within digital environments in which there is increasing emphasis on diversity, autonomy, openness, and connectivity (Downes, 2012, p. 85).

The future of knowledge.

Much of traditional liberal education has been determined by the Cartesian *Cogito* and has consequently tended to view students as disembodied rationalities - this can be perceived as reflecting a broader distinction between mind / body and subject / object within western thought. From Plato to modernity a 'metaphysical duality existing between the mind and the natural world' (Bulle 2017, p.258) was prevalent and posited notions of the immaterial substance of the soul / mind, similar to that of the immutable world of Ideas or intelligible Forms (ibid), in contrast to the derivative and ever changing differences within the material world; accordingly, because the mind was perceived as bringing humankind closer to the divine, it was this mind-body dualism that was at the basis of pedagogical models developed. The knowledge taught and the approaches used within these models was intended to increase students' abilities to approach given truths and to train their minds in connection with dominant epistemological assumptions. Such orderly frameworks of knowledge arguably concur within standardised curriculum models throughout the industrial age, in which schools were 'created in the image of industrialism [...based] on the principles of the assembly line and the efficient division of labour' (Robinson 2010, p.230).

However, the seismic challenges of digital / technological disruption and socio-political change within contemporary society has led to much debate about the changing nature, value and application of knowledge. Traditional dualistic and industrial models of education have been increasingly perceived as anachronistic by failing to reflect the current status of knowledge, whilst also hampering the development of students' creativity, curiosity and critical insight. In recent decades, Platonic logocentric assumptions in dualistic thought, with their appeal to self-present

truths, have been challenged in favour of an ontology of difference in which identity is perceived as a product of relationality without essence or fixed meaning (Derrida 1978, 2012; Deleuze and Guattari 1994; Lyotard 1988); in this context, knowledge has been relegated from truth-claims to notions of 'performativity' within a post-industrial society (Lyotard 1984). From this perspective, the use and application of knowledge becomes less about 'simple and durable "truths"' and more about our ability to 'manage complex and rapidly changing environments' (Downes 2012). In the digital age there is the assumption that education's 'roots as "factory-school model" [...] are no longer capable of meeting the needs of today's society [...therefore, there is an] appeal to systemic change – from hierarchical control to flexible and adaptive networked models' (Siemens, 2008, p.8). As such, traditional education is increasingly viewed as incongruous as we shift from 'an economy based on physical inputs –land, capital, and labor – to an economy based on intellectual inputs, or human creativity' (Florida, 2006, p.22). This move towards dynamic and decentred rhizomatic knowledge challenges established representational epistemologies with their convergent pathways and appeals to fixed self-present knowledge. In an age characterised by constant flux and change, education is increasingly perceived as serving the wider purpose of enabling citizens to handle an 'uncertain state of being [and assisting] in living purposively amid [this uncertainty]' (Barnett 2004, p. 72). This role for education corresponds with wider international ambitions articulated by the Organisation for Economic Co-operation and Development (OECD), where 'future-ready students will need both broad and specialised knowledge' (OECD 2018, p. 4) in which to think effectively across disciplinary boundaries and 'connect the dots' within a rapidly changing, transdisciplinary and interconnected world.

Despite an increasing focus on the need for transdisciplinary thinking and creativity, old habits prove resilient; there remains a strong current of educational practice tied to traditional dualistic and industrial models. A culture of entrenched compartmentalisation within both schools and universities persists that often encourages both teachers and students to pursue learning through prescribed knowledge content and the lens of single epistemological viewpoints (Bernstein 2000); such compartmentalisation both legitimates and defines not only the disciplinary boundaries of curricular knowledge, but also what it is to be an educated person within this system (ibid). This siloed approach negates difference, relationality and the opportunity to call on other disciplines in the construction of knowledge. A current example of this continued tendency would be 'knowledge-rich' curriculums that focus on prescribed content within strict disciplinary boundaries. Principally influenced by E.D. Hirsch's theory of core knowledge, this unapologetically conservative approach advocates the learning of established literary canons and knowledge (certain facts, ideas and knowledge) in which to ingrain the 'best' of our culture within students; it is argued that this approach allows students to communicate successfully within society and, subsequently, develop the skills needed to operate effectively as citizens (Hirsch 1987, 2007). Critics of 'knowledge-rich' curriculums highlight how they risk restricting knowledge within the boundaries of an established monoculture that lacks diversity and, at worst, reduces learning to a superficial list of information that does not develop students' capacity for higher-level thinking (Morgan 2022). Another example is Direct Instruction (DI); this approach advocates a hierarchical teacher-led form of teaching via repetition and rote learning (Bardash 2012; Engelmann and Becker 2022). DI has been criticised due to a perception that its strict scripted procedures limit both student and

teacher creativity (Hattie 2009, pp. 206–207); it has also been criticised for its lack of sensitivity to the many diverse cultural contexts of students (Ryder, Burton & Silberg 2006).

Arguably, a more relevant approach to education that reflects the changing nature of contemporary society (one that facilitates creativity and rhizomatic open-ended transdisciplinary thinking, whilst providing purpose, value, insight and agency for students) would perceive knowledge as 'neither a representation of something more 'real' than itself, nor an 'object' that can be transferred from one place to the next [...rather it is to be understood as emerging] as we, as human beings, participate in the world' (Osberg / Biesta 2008, p.313). The developing field of Edusemiotics might provide such an approach as it problematizes the prevalent role of formal instruction and does not aim to attain finite and indubitable knowledge. Edusemiotics demands a continuous engagement with signs through open-ended practical inquiry in which to enrich experience with meaning and significance; as such, it intends to provide a 'novel open-ended foundation for knowledge which is always already of the nature of a process [...within the] unpredictable circumstances of lived experience' (Deely & Semetsky 2017, p. 216).

Edusemiotics and Learning

Edusemiotics challenges modernity's dominant theories of learning; informed by Cartesian dualist notions of mind / body, these theories have a tendency to view students as disembodied rationalities. According to Siemens:

[a] central tenet of most learning theories is that learning occurs inside a person. Even social constructivist views, which hold that learning is a socially

enacted process, promote the principality of the individual (and her/his physical presence – i.e. brain-based) in learning. These theories do not address learning that occurs outside of people (Siemens, 2005, p.5)

From the point of view of Edusemiotics, when ‘mind and matter are thought of as fundamentally distinct, learning is reified and mystified’ (Olteanu & Campbell 2018, p.247). Edusemiotics differs from traditional approaches to teaching that tend to be highly didactic and content-centred, as well as progressive approaches that tend to be learner-centred or process-centred. According to Stables (2010), highly didactic, content-centred education erroneously divorces content from process and assumes, despite differences, there is a mutual relationship of meaning between student and teachers. Process-centred approaches are often perceived as relying on a ‘decontextualised view of process that does not relate to cultural practices’ (ibid p.29), whereas, learner-centred approaches have a tendency to view the learner as a given ‘rather than an identity in flux and under construction’ (ibid). In contrast, Edusemiotics, as a sign-mediated approach to learning, negates an underlying view of learning as occurring through a reified disembodied mind; this approach perceives learning as a semiotic process that has the advantages of being both activity-centred and learner-aware.

Rather than perceiving education as a Cartesian dyadic relation between a knowing mind and known objects, Edusemiotics views all life and learning as a semiotic process in which meaning is always already mediated in a triadic relationship – this process negates the notions of learning as either a mind dependent reality or a mind-independent reality. The term semiotics is defined as the science of signs. Edusemiotics is a neologism coined by Marcel Danesi (2010) that emphasises the semiotic processes inherent to learning. The notion was created

to distinguish *semiotics as education* (edusemiotics) from the mere use of semiotics as a pedagogic tool that remains within the boundaries of conventional approaches to learning. As a theory, Edusemiotics conceives all meaning making, whether conscious or unconscious, to be a process of *semiosis*: the notion that all human experience, without exception, is marked and proceeds by signs and signals.

Modern semiotics is largely influenced by two theorists: Ferdinand de Saussure and Charles Sanders Peirce. Saussure's conception of semiology focuses on the role and function of linguistic and textual signs in the generation of meaning; it is this model of semiotics that mostly informed 20th Century Structuralist theory, to be found, for example, in the work of Claude Levi-Strauss, Lacan, Althusser and key works by Roland Barthes. In contrast, Peirce's notion of semiotics goes beyond text and verbal utterances and has a broader conception that incorporates three types of signs: a) icons, signs that convey an object by way of similarity or analogy (photographs and realist paintings are examples); b) indices, signs which basically point to an object, often through causation, and cannot exist without the presence of the signified (smoke is an index of fire, dark clouds are an index of rain, a footprint is an index of a foot); c) symbols, signs which represent an object through arbitrary convention (language, text and numbers are good examples) (Peirce 1991, p.239-40). It is Peirce's broader, ubiquitous conception of signs that informs edusemiotics, as it accounts for meaning making across all realms of lived experience.

For Peirce a sign means 'anything which conveys any definite notion of an object in any way' (Peirce 1931, p. 540). Peircean semiotics is defined by *semiosis*, a process that underlies Edusemiotics as a theory of learning. Semiosis as a concept describes the dynamic process of meaning generation through signs; it involves a 'continuous interpretation of signs, ensuring a string of representations as the growth of

[meaning]' (Quay 2017, p.84). Unlike dualist propositional thinking, semiosis occurs through a triadic relationship of sign-object-interpretant (Figure 1).

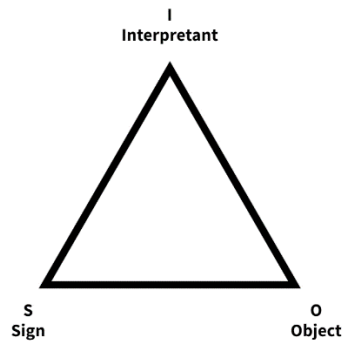


Figure 1: Peirce's triadic sign model

For Peirce, a sign can be anything that 'stands for something else, its object, in such a relation so as to generate another sign, called [...] an interpretant' (Semetsky 2014, p. 3). A sign then, represents the object understood in a particular way, this understanding being the interpretant. The action of this triadic relationship is simultaneous and should not be understood as a series of separate steps. In other words, an 'interpretant is the interpretation that goes hand in hand with the immediacy of semiosis - sign-representing-object - in living experience' (Quay Op Cit, p. 85). The role of the interpretant means that the 'action of signs is [...] always mediated [...] The sign not only stands for something other than itself, but it does so for some third' (Deely & Semetsky 2017, p.210). This process of mediation means that understanding cannot be reduced to a direct relation between a sign and its object that leaves no room for a sign's potential or future meaning. The triadic nature of semiosis is characterised by the included middle, in contrast to the logic of the excluded middle prevalent in dualistic propositional thinking. The logic of the excluded middle postulates the rule of non-contradiction, of 'either/or' – if something

is A, it cannot also be NOT A; the rule of this logic also states that if a state A and not-A exist, a state T cannot exist which is simultaneously A and not-A. In contrast, semiosis follows the logic of the included middle which operates as a mediating third, the interpretant, that perceives signs as relational entities that indicate 'something other than itself which is not immediately apparent' (Semetsky Op Cit p.4). This notion of sign meaning constituted by dynamic mediated relations, the included middle, avoids the dualistic EITHER / OR in favour of the conjunction AND (A AND B) which provides a logic of multiplicities that goes beyond the reductive logic of identity to be found in dualist thinking. As such, learning as a process of semiosis within the world always comprises of 'a series of interpretants which can be always further interpreted [...] therefore replacing a single truth [...] with a wealth of multiple and potentially unlimited, meanings embedded in the dynamics of the evolution of signs' (ibid p.4-5). One of the consequences of perceiving meaning making as a relational act as we participate in a world of signs is that it forefronts the notion of abduction; whereas deduction and induction involve a logics of justification, abduction involves a 'creative logic of discovery [...] whereby new ideas are seized upon' (Deely & Semetsky Op Cit, p. 216). With regards to inference, deduction takes a top down approach by exploring the necessary consequences of a rule; induction goes in the opposite direction and starts from the ground up by having a theory in mind and then seeking confirmation across cases. In contrast, abduction does not start with explanations but instead links things together to generate an order / meaning that fits the surprising facts – in this sense, abduction is the beginning of theory building. As such, semiosis is a learning process that involves the 'growth and the evolution of consciousness as the function of engaging with, and learning from, signs situated in life' (ibid p.216).

The triadic nature of signs led to Peirce's classifying them in terms of categories of Firstness, Secondness and Thirdness: First is the conception of being, pure sense, existing independent of anything else; Second is the conception of being relative to, the conception of reaction with, something else; Third is the conception of mediation, whereby first and second are brought into relation (Peirce 1991, pp.188-9) - mediation ensures the included middle that constitutes a relation between what would have otherwise remained two distinct differences. Importantly, the notion of Firstness, Secondness and Thirdness allows semiosis to go beyond an anthropocentric perspective within dualist accounts of learning which is premised upon the human mind's capacity for language. As Stables (2010) points out, 'firstly, there is an assumption that only humans are, and can be, sign users, just as only human communication can properly be understood as "language"; secondly, and by implication, sign use is an aspect of mind (as opposed to 'body'), and only human beings have minds' (p.22). Edusemiotics challenges this assumption, claiming that learning processes occur more broadly in nature and that learning is not fundamentally a linguistic articulation but is, more generally, a meaning making that occurs through semiosis (Olteanu & Campbell 2018, p.248). Following the notion of firstness, our awareness and understanding can be perceived as being dependent upon sensations that precede concept formation and language. From initially proceeding from a notion of firstness, it can be argued that both animals and humans are subject to the process of semiosis and that no strict distinction exists between them in this regard. For all animals, including humans, to sense is to enter into a relationship between things - there is no situation in which a sign-relation is not at work. As Sebeok (2010) indicates, 'the phenomenon that distinguishes life forms from inanimate objects is semiosis. This can be defined simply as the instinctive

capacity of all living organisms to produce and understand signs' (p.3). To further this point, Sebeok states:

All organisms communicate by use of models (Umwelts, or self-worlds, each according to its species-specific sense organs), from the simplest representations of maneuvers of approach and withdrawal to the most sophisticated cosmic theories of Newton and Einstein. (Sebeok 2001, p.23).

If semiosis characterizes biological life, then learning can be perceived as being both continuous in the biological realm and part of an evolutionary Darwinian view in which humans, like other animals, are environmentally dependent organisms and subject to adaptation. This leads to the valuable insight that when education follows convergent models of learning and knowledge, they risk failing to fulfil the fundamental role of learning as a process of adaptation - learning cannot be achieved by an analytic Cartesian mind that observes the world from which it is detached, but by a 'semiotic consciousness that constructs an expanded field of meanings informed by lived experience' (Deely & Semetsky Op Cit, p. 214). As Olteanu and Campbell (2018) highlights, 'when educational institutions obstruct rather than facilitate the capacities of individuals or groups to develop more complex and insightful models of reality, these institutions contradict the rationale for which they emerged' (p.253). Given this anti-anthropocentric viewpoint which highlights the embodied and sensory foundations of learning, it becomes apparent that other modes of meaning making should be given greater consideration beyond the prioritisation of language and linguistics within the dualist account. Peirce's triad of sign types - icon-index-symbol – allow us to move away from traditional symbolic (language) accounts of learning to 'recognize more fully the embodied and sensory foundations of indexicality [...] and iconicity' (ibid pp.254-5). As Stables indicates,

such a move would highlight the importance of learning in realms other than those which prioritise mind-language, for 'physical education is concerned largely with "training the body" while other forms of education also involve elements of non-conscious physical response, including all forms of education in the arts' (Stables Op Cit p.22).

In summary, understanding *semiosis* as a process in which meaning is generated through the mediation of difference inherent to the interpretation of signs is to position relationality itself as an ontological ground for learning. As such, Edusemiotics disrupts notions of self-present substance dualism (this is this, because it is not that) within traditional education and, in contrast, perceives perpetual becoming (this is always becoming that) as characteristic of the learning process instead. Such a process is perceived as continuous with the biological realm of adaptation and recognises the importance of sensation to learning beyond mind-language forms of conscious rationality. Such a view of learning has important implications for education in this constantly changing, interconnected and transdisciplinary digital age.

Implications for Rhizomatic Learning and Education

The notion of the included middle within Edusemiotics has a clear affinity with a Deleuzian differential ontology which provides the epistemological foundations for Rhizomatic Learning. According to Deleuze, the conjunction AND is 'the path of all relations, which makes relations shoot outside their terms' (Deleuze and Parnet, 1987, p. 57). What follows is an exploration of the implications of Edusemiotics, and the process of semiosis, for rhizomatic learning and education.

Rhizomatic learning recognises that learning is a complex process of sense-making that makes creative connections across traditional boundaries to which each learner brings their own context and has their own needs. It poses a challenge to traditional modes of thinking by encouraging students to adopt an unrestricted and creative approach to learning. Rhizomatic learning perceives as a decentred, hybrid and diagrammatic process, rather than a linear and convergent one (Cormier, 2008). The approach endorses the making of new learning connections outside the prescribed trajectory that often defines a convergent, hierarchical and dualistic relationship to knowledge that, as we have seen, is increasingly incompatible with the needs of a contemporary globalized society.

First popularised by Deleuze and Guattari in *A Thousand Plateaus* (1988), the rhizome is a botanical metaphor used to convey emergent decentred production of thought beyond self-present identity thinking. As a biological form, a rhizome constantly territorialises and deterritorialises without any established organising centre; as Deleuze and Guattari points out, the

rhizome operates by variation, expansion, conquest, capture, offshoots [...it] is an acentered, nonhierarchical, nonsignifying system without a General and without an organizing memory or central automaton' (Deleuze / Guattari 2005, p.21)

The rhizome therefore provides an effective metaphor for the decentred, networked generation of knowledge advocated for within contemporary society, regardless of whether this manifests itself within a transdisciplinary physical classroom, or within an online learning environment. From a rhizomatic viewpoint, 'knowledge can only be negotiated, and the contextual, collaborative learning experience [...] is a social

as well as a personal knowledge-creation process with mutable goals and constantly negotiated premises' (Cormier, 2008, p.3). As highlighted, edusemiotics advocates a meditated approach to learning in which knowledge is created through the interpretation of signs; the role of the interpretant in semiosis ensures that the construction of meaning is always contextual, subject to negotiation, and not prescribed in advance. As such, an edusemiotic approach to education fosters an emergent environment in which new rhizomatic networks and assemblages of knowledge can be created, depending on the given relations, individuals and subjects involved; as such, the approach generates 'singular processes of learning' (Deleuze, 1994). Semiosis as a meaning making process transforms learners into active participants in the creation and interpretation of signs, therefore facilitating the emergence of new concepts and meanings that generates new rhizomatic, hybrid understandings and, ultimately, new ways of living; such active interpretation transcends the notion of learners as passive observers within traditional forms of education that often reduces learning to mere social reproduction, whereas learning is at its 'most exciting [when] it refers to something that at least feels new for the individual' (Stables 2010, p.27). One of the advantages of an edusemiotic approach to rhizomatic learning is that it gives students a sense of agency over their own learning. By facilitating an approach in which students become active interpreters of signs and participants in learning, edusemiotics provides a learning experience in which they can recognise how their own individual and collaborative actions contribute simultaneously to their own self-development and mastery of understanding; importantly, it also makes them conscious of the value of both the process and product upon the learning journey (ibid p.29). As edusemiotics perceives sign-laden learning environments as interpretative communities, it also

provides a means by which to value and comprehend the relationship between the unique learner and the wider learning community. By understanding that each learner has a previous semiotic conditioning that they bring to the context of any current semiotic interpretation, the learning community is encouraged to both appreciate, comprehend and value the unique differences of meaning that any learning situation can generate; it also teaches students to balance, appreciate and respect other learning identities in relation to their own.

From the viewpoint of Deleuze and rhizomatic learning, learning is perceived as a disruptive encounter and not an act of recognition or recollection that is often found in traditional dualistic models of education. For Deleuze, learning occurs when confronted with the virtual – the virtual is the potentiality that exists within signs prior to becoming signifieds that can be understood and represented within our habits of thought. During the learning process, such virtual signs ‘cause problems’ through their disorientating shock, forcing thought to deal with experiences that disrupt the common coordinated functioning of the senses and faculties’ (Bogue, 2004, p.337). Given this perspective, rhizomatic learning perceives understanding to be the product of an encounter in which the learner interacts with signs and considers them in relations to particular situations and cultural contexts – learning is therefore a process in which we interpret and move with signs within the world until we significantly understand their potential for action therein. For Deleuze, our immersion amongst virtual signs allows us to ‘make, remake and unmake [...our] concepts along a moving horizon, from an always decentered center, from an always displaced periphery which repeats and differentiates them’ (Deleuze, 1994, p. xx–xxi). Semiosis is both the means and method by which learning through disruptive encounters can be understood, it provides a notion of meaning making that occurs

within rhizomatic lines of flight that such encounters initiate. By understanding education to be an apprenticeship in and amongst signs, edusemiotics allows students to engage in abductive enquiries of relationality where the outcome of problems cannot be set out in advance; the disruptive encounters, provocations and dilemmas faced in a learning situation (whether in the classroom, an online learning environment or in the wider world) give rise to new meanings that are often contrary to prescribed outcomes and the expectations of standardised testing in traditional education - as such, edusemiotics can be perceived as providing a novel open-ended relationship to knowledge; importantly, such a relationship instils a sense and appreciation, in both student and teacher, that a learning outcome in response to an encounter is subject to variability and cannot be fully known and played out in advance.

Rhizomatic learning implies a specific notion of the subject and their position within the process of learning, as well as the role played by interacting with others. For Deleuze and Guattari, the subject is an assemblage, a haecceity, constituted by a series of intensities that are constantly subject to change and transformation – the term haecceity is used to indicate this individuated specificity:

You are longitude and latitude, a set of speeds and slownesses between unformed particles, a set of nonsubjectified affects [...] It should not be thought that a haecceity consists simply of a décor or a backdrop that situates subjects [...] It is the entire assemblage in its individuated aggregate that is a haecceity. (Deleuze and Guattari, 2005, p.262)

From this perspective then, there is no such thing as the self-contained subject in learning; as St.Pierre (2004) points out the humanist, mind /body subject of learning is a fiction and the Cartesian Cogito does not exist. Rather, we are the sum of specific flows of intensities and potentialities always in flux – the subject is transformed by whichever specific rhizomatic assemblage it finds itself in within the world; the subject is therefore always mediated and in a process of becoming. The notion of the subject as a point within a rhizomatic assemblage has clear implications for education. From the point of view of rhizomatic learning, there is a risk that the traditional subject is reproduced which is ill equipped to face the current dilemmas within a 21st century transdisciplinary world, as Deleuze (1988) warns, ‘we continue to produce ourselves as a subject on the basis of old modes which do not correspond to our problems’ (p.107). In contrast, from the viewpoint of rhizomatic learning, both teacher and student are immersed within a decentred network of relations that affects the potentiality of both, rendering traditional hierarchal and linear relations to signs and subjectivities obsolete. The act of semiosis provides the means by which to understand meaning making as a mediated act of becoming within a rhizomatic world in which we are negotiated signs ourselves – as Semetsky argues:

it is the act of mediation, via the interpretant, that ‘connects otherwise binary opposites of subject and object, mind and matter, self and other. We are signs among signs [...] Hence, like every sign, we also have the potential to grow and to become ‘more fully developed’ (Semetsky (2014, p.5).

As mutually intertwined and mediated assemblages within a learning space, the teacher and pupil are both afforded enhanced possibilities to develop new knowledge and enhanced understandings and are themselves transformed in the

process. As Stables suggests, each learning activity provides 'both an invitation and a threat [...] for the very act of presenting a new piece of information or asking someone to undertake a new activity is a way of telling them that their world is not quite as it was before' (Stables Op Cit, p. 28). When posed with a learning problem, the teacher learns with the student with reference to mediated signs that allow both teacher and pupil to discover connections that are pertinent to their own and other's subjective lives – in this way, learning becomes a creative act in which new ideas are formed. As Deely and Semetsky argue:

The edusemiotic process of the evolution of signs intrinsically determines new opportunities for human development and transformative education and necessarily encompasses the future-oriented dimensions of becoming, novelty and creativity [...] Edusemiotics posits a teacher and a student as one unified [...] whole—a sign, a relation. They are interrelated and interdependent by virtue of being embedded in the common 'interpretant' comprising shared meanings. (Deely & Semetsky Op Cit, p. 216)

Such rhizomatic learning spaces, in which semiosis occurs, therefore have an ethics of creativity which is committed to 'experimentation rather than the transmission of facts or inculcation of values' (May and Semetsky, 2008, p.143). In this spirit, 'the rigid classroom of old becomes a frenzied workshop of shared desires, and a playground of signs waiting to be discovered' (Drohan, 2013, pp.130-1). In contrast to traditional education, Deleuze highlights the transformative act of mediation performed by the role of the teacher in educative rhizomatic and semiotic environments, he states:

[W]e learn nothing from those who say: 'Do as I do'. Our only teachers are those who tell us to 'do with me', and are able to emit signs to be developed in heterogeneity rather than propose gestures for us to reproduce (Deleuze 1994, p. 23).

By perceiving both subjectivity and learning as an intertwined process of creative becoming, the act of semiosis within a rhizomatic educational environment ensures that education is about positive identity development in which learning contributes to making significant events in each student's life story (Stable Op Cit). As we have described, by perceiving semiosis as continuous with the biological realm of adaptation, edusemiotics also provides significance for the subject beyond language-based forms of learning; by understanding wider processes of life to be adaptive responses to signals, semiosis provides a greater role for sensation within learning and allows greater importance for Peircean iconic and indexical signs beyond the typical focus of symbolic language within rationality. This provides a more integrated approach to learning in which instinctual, emotional, practical and intellectual modes can be fully considered in the production of meaning; such integration problematises the distinction between practical, intellectual and expressive modes of learning to be often found within education and avoids categorising learner's subjectivity into these categories. As Stables points out:

the distinctions between, say, thought and feeling are not absolute on a semiotic account, for reaction to a situation can involved physical arousal (emotion), the running through of linguistic scripts (reasoning/ language) and a combination of these (feeling), yet these are all related. It is a matter of emphasis, not of dividing the curriculum so that each part deals exclusively

with one aspect of human response, or even with a neatly defined combination of them. (ibid, p.30)

Notions of learning as a mediated encounter in which concepts emerge within interpretative communities has particular pertinence for 21st Century digital rhizomatic learning environments; such environments have become especially important in the post-covid era where greater emphasis has been placed on remote and asynchronous learning (Lemay, Bazelais and Doleck 2021). Each technology that transforms our mode of communication and representation also changes and mediates our relationship to knowledge and the generation of meaning. In this sense, the means by which we receive signals transforms our semiotic relationship with the world; as McLuhan (1964) indicates, the form of communication and interaction afforded by different technologies generates a 'change of scale or pace or pattern that it introduces into human affairs' (p.1). If, as we have argued, all meaning is the outcome of semiosis, a process of which we are a part, then the means by which we communicate and interact with signs will also affect our identity; in this sense, our subjectivities are always a hybrid relation mediated by the types of technology we use; as Haraway famously pointed out, 'we are all chimeras, theorized and fabricated hybrids of machine and organism [...a condition that structures] any possibility of historical transformation' (Haraway 1985, p.7).

According to Dewar (1998), our technological trajectory has moved us from Listeners to Readers to Users. Prior to print, learning and understanding primarily involved listening (to someone read a manuscript or give a lecture) – in such a mode, the spoken word and memorization of knowledge was paramount. In printed culture, people shifted from being listeners to being readers. Reading standardised, reproducible printed material signalled the abandonment of the principle that texts

were derivative, corruptible representations of memorised spoken knowledge. In such circumstances, the role of the teacher as the progenitor of knowledge began to be demoted as learning could be undergone increasingly without their presence, privately. Finally, the connected, decentred and less-sequential nature of online digital information requires that we become more interactive users of information and knowledge – in this digital environment, the learner can access information instantaneously and enter into dialogue with others in which to generate meaning and understanding. The form and properties of digital environments, require that we actively engage with knowledge rather than passively consume information. As Siemens highlights,

[w]e do not consume knowledge as a passive entity that remains unchanged as it moves through our world and our work. We dance and court the knowledge of others – in ways the original creators did not intend. We make it ours, and in so doing, diminish the prominence of the originator. (Siemens, 2006, p.7)

As a consequence, students' immersion in digital media changes their expectations and learning experience due to it being 'based on seeking, sieving, and synthesizing, rather than on assimilating a single "validated" source of knowledge as from books, television, or [...] lecture' (Dede 2005 p.7). For Downes, knowledge in the digital age is both generated and distributed across a network of connections characterised by 'diversity, autonomy, openness, and connectivity' (Downes, 2012, p. 85). These characteristics constitute effective conditions for learning activity within a digital environment: connectivity allows connections to be made between participants and an abundance of information; diversity provides the widest possible spectrum of points of view; autonomy allows participants to recognise and generate new

connections; openness allows perspectives to be entered into the system and engaged with by others. Digital learning therefore has a clear affinity with the concept of the rhizome in that it provides an open, decentred and non-linear approach to education in which new emergent meanings and connections can be made; in this sense, it is opposed to knowledge acquisition as self-present truths that have often been emphasised within traditional classroom teaching. Knowledge within digital environments is acquired by navigating a series of nodes, understood as points within an online network in which a plurality of information both intersects and branches out to generate hybrid knowledge. Accordingly, users of digital communication can become 'nodes' themselves, equally capable of sharing their knowledge and expertise with other individuals (Kropf, 2013, p.13). In this regard, digital learning correlates with an edusemiotic approach to education in that students and teachers enter a mutual non-hierarchical relationship to the creation and interpretation of meaning. Arguably, the notion of learners as nodes themselves within a digital network continues the trajectory of the diminishing role of the traditional teacher, their centrality in the learning process being further undermined by learners' increasing capacity to actively make their own semiotic connections and meanings within a rhizomatic environment without the didactic interventions from an educator. Edusemiotics therefore might provide the means by which the generation of autonomous, novel and emergent knowledge through the use of digital technology can be understood.

Conclusion

Traditional theories and approaches to education that foreground unmediated self-present relationships to knowledge have been found to be anachronistic by failing to reflect the changing status of knowledge in a rapidly evolving environment. A decentred rhizomatic approach to education is arguably more appropriate in that it nurtures emergent ideas, concepts and new meanings beyond fixed, established knowledge; this is achieved by appealing to students' capacity to mediate between a variety of information and forge new connections – this capacity is increasingly important within a digital world in which citizens need to navigate, negotiate and evaluate constantly evolving information in which to tackle contemporary transdisciplinary questions and problems. Edusemiotics provides a means and method to both facilitate and understand this capacity for learning. With reference to semiosis, edusemiotics outlines how meaning is generated through the mediation of difference within signs via the role of the included middle, the interpretant; this constitutes a continuous process in which new knowledge and understanding is created without resorting to established conceptual frameworks within a metaphysics of presence. By providing the means to generate new meaning through semiosis, edusemiotics equips learners with a sense of agency and consequently provides them with an appreciation of their own active participation in the generation and interpretation of signs; it thus gives students a recognition of the importance of process within learning, as well as an awareness of their own role in self-transformation, development and knowledge creation; it therefore valorises the unique individual learner in relation to the wider learning community. By recognising that semiosis is continuous with the biological realm of adaptation, edusemiotics also highlights the importance of sensation beyond mind-language forms of conscious

rationality, it therefore expands the notion of what it means to be a learning subject and provides a more integrated consideration of instinctual, emotional, practical and intellectual modes of knowledge within and across disciplines. In summary, edusemiotics therefore provides the means to deterritorialise knowledge and move beyond habitual patterns of thought; such a move allows new hybrid ideas to be generated that are compatible with an increasingly interconnected and transdisciplinary age.

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