

Interpreting enactivism for learning and teaching

ANDY BEGG

Abstract: *Enactivism is a way of understanding how all organisms including human beings, organize themselves, and interact with their environments. This vision contrasts with traditional ideas of learning that are based on a separation of the learner and the world. From an enactivist perspective the teacher is a relevant aspect of the learners' environment. This paper has two parts, it begins with some ideas about enactivism, then it shows a personal journey and some factors that made me reconsider how I see myself, how I learn, and how I see the learning/teaching relationship.*

Riassunto: *L'Enattivismo è una via per capire come tutti gli organismi, compresi gli esseri umani, vivono, si organizzano e interagiscono con il loro ambiente. Questa visione contrasta con le idee tradizionali di apprendimento che si basano sulla separazione del discente e del mondo. Dal punto di vista dell'enattivismo un insegnante è un aspetto importante dell'interazione. Questo lavoro ha due parti, inizia con alcune idee su enattivismo, poi passa ad illustrare un percorso personale e alcuni fattori che mi hanno portato a riconsiderare come mi vedo, come conosco e come vedo la connessione apprendimento / insegnamento.*

Keywords: *Enactivism, Education, Learning, Teaching.*

PART 1

Introduction

Enactivism is largely based on ideas about self-producing (autopoietic) living systems from the biologists Maturana and Varela (Maturana, 1970; Maturana, Varela, 1980, 1987). It has been elaborated on by Varela, Thompson, and Rosch (1991) and summarized by Capra (1996). It draws upon and is linked to ideas from systems theory and complexity (von Bertalanffy, 1968), biology (Bateson, 1972), and phenomenology (Merleau-Ponty, 1962). The essence of enactivism is:

learning is living, living is learning, and this is true for all living organisms.

With enactivism we and the world are inseparable; we co-emerge – cognition (learning) cannot be separated from being (living). Knowledge is the domain of possibilities that emerges as we respond to and cause changes within our world.

For me enactivism fits with numerous other ideas that interest me. These include Eastern and European psychology (Molino, 1998; Fromm, 1978, 1993), feminist thinking and emotion (Gilligan, 1982; Belenky, Clinchy, Goldberger, Tarule, 1986), caring thinking (Noddings, 1992), ecopsychology (Lovelock, 1979; Roszak, Gomes, Kanner, 1995; Sessions, 1995), Eastern ways of thinking and knowing (Gunaratana, 1991; Krishnamurti, 1954, 1955; Nhât Hanh, 1975; Nisker, 1998), ideas about the learning and knowing of traditional indigenous people (Wolff, 2001), and the place of thinking in education.

Enactivism has been interpreted for educators by numerous writers, and I have been influenced by Davis and his colleagues (Davis, 1996; Davis, Sumara, Luce-Kapler, 2000); but in my experience teachers often feel uncomfortable with enactivism because they simply want to know what they are expected to do.

Santiago/enactivist theory

Capra (1996) explains the interrelatedness within and between living systems and wrote

In the emerging theory of living systems mind is not a thing, but a process. It is cognition, the process of knowing, and it is identified with the process of life itself. This is the essence of the Santiago theory of cognition, proposed by Humberto Maturana and Francisco Varela (257).

This theory implies that our perceptions and experiences occur through and are mediated by our bodies and nervous systems; we cannot generate a description that is a pure description of reality, independent of ourselves. Our experiences reflect ourselves as observer; our knowledge does not exist except as we distinguish it. It is not just that we cannot access an existing reality, but rather, our realities are brought into existence through our activities as observers. From a biological point of view ‘learning’ merges with action as patterns of neuronal firings (or resonating neuronal assemblies)

that have evolved over time react in situations involving activity. The patterns of firings change as the individual has new experiences and as they come to see things differently. Capra (1996) suggests that this evolutionary change process is a mathematically 'chaotic' one involving dynamic systems.

Complexity

In terms of sense-based knowing/thinking, Varela, Thompson and Rosch (1991) wrote that, *cognition depends on the kinds of awareness that come from having a body with various sensorimotor capacities*. They see a living organism (person, animal, or plant) and their environment as needing to be considered together, that one can not separate knowing from doing and from the body, and that knowing is doing which in the end is inseparable from self-identity or being.

They also elaborated on Merleau-Ponty's phenomenology and claim that the body needs to be understood as both physical/ biological, and at the same time, as experiential/phenomenological. From this perspective our mind (the non-physical faculty linking the body/nervous system/ brain and our consciousness of the world) also links us with others and both the biological and historical world. All these inter-relationships imply complexity.

The complexity and interrelationships within Merleau Ponty's phenomenology resonates with chaos and dynamic systems and with enactivist ways of knowing that involve 'being-in-the-world', 'knowledge-in-action', and awareness (or non-cognitive knowing). These ways of knowing can be interpreted in a number of ways from the analytic perspective of traditional psychology to one that pushes cultural boundaries and fits more with direct knowing of Eastern philosophy and traditional indigenous people. While phenomenologists seek descriptive rather than interpretive accounts, these descriptions are based on a 'deep understanding' which suggests more than traditional cognitive knowing.

Enactivism within education

These ideas have been interpreted within education by numerous people including Davis (1996) and his colleagues (Davis, Sumara, Kieren, 1996). For them, with enactivism, instead of seeing learning as “coming to know”, the learner and the learned, the knower and the known, the self and the other, are all co-evolving and co-implicated. The context is neither the setting for a learning activity, nor the place where the student is, but rather, the student is literally part of the context. With enactivism the complexity of learning is emphasised:

learning should not be understood in terms of a sequence of actions, but in terms of an ongoing structural dance – a complex choreography – of events which, even in retrospect, cannot be fully disentangled and understood, let alone reproduced (Davis, Sumara, Kieren, 1996, 153).

Enactivism emphasizes knowing rather than knowledge. This contrasts with constructivism where knowledge is interpreted as a human construct and evaluated in terms of its fit with the knower’s experience. Even with radical constructivism (von Glasersfeld, 1995) the emphasis is on individual interpretation of and abstractions from experience, and these are acknowledged as being shaped by the learning context, by interaction with others, and by the social milieu. Davis (1996) sees both radical and social constructivism as being based on the modernist separation of self from other and from the world; and claims that both versions of constructivism have difficulties because they see knowledge as something, and want to assign it a location.

Bateson (1972) provides an alternative to this need to locate knowledge, he says that there is no such thing as information, it is not knowledge-as-object but knowledge-as-action. This fits with the idea of Davis (1996), he wrote that in enactivism collective action is not for individual sense-making but as a location for shared meanings and understanding because cognition is not in minds and brains but in the possibility for shared action. Knowledge is not apart from world but embedded in it in a series of increasingly complex systems (groups, schools, communities, cultures, humanity, biosphere), and embodied knowledge extends to these bodies that are larger than human. Varela (1992) reinforces this, he saw enactivism as providing an alternative to the constructivists’ notion of representation by

focussing on self-organizing systems. From this viewpoint he questioned the existence of a world independent of the knower and sees the knower, the knowing and the known as emerging together.

Enactivism in the classroom

Davis is concerned with practice in the classroom. An important implication for teaching that fits with enactivism is listening (Davis, 1996) – not at a shallow level but at a deep level. He discriminates between evaluative listening (the traditional evaluative role taken by teachers), interpretive listening (which cuts through the noise of ‘play’ and leads to more flexibility in the classroom), and hermeneutic listening (which involves more negotiation and co-implicated activity within the classroom). He sees listening as often situated in a ‘play’ situation; and as a situation where ‘subjectivity loses itself’.

Play is ‘not the opposite of seriousness’ but rather ‘seriousness in playing is necessary to make play wholly play’ (Gadamer, 1990). Davis’s (1996) notion of play recognizes that play only exists in the playing, it involves the use of ‘body time’ and requires totally involvement. He sees play as an essential human quality that is evident in all we do and as something that can be realized in stillness, and in solitude.

Davis (1996) sees past learning theories as not explaining non-cognitive or unformulated learning because our concern is with formulated (or conscious) knowledge and because we see the cognising agent as being separate from the world. He discriminates between formulated and unformulated knowledge and says much of what we do is unformulated as we are not conscious of doing it, at the same time, formulated and unformulated knowledge are complementary and inseparable. He talks about what we think about and say (formulated) and what we do without conscious thought (unformulated), and suggests that through the *play* between these we find space for learning.

Enactivism for Davis explains unformulated knowing because “every act is an act of cognition” and “we are not separate from but coupled to our situation/context”, or as Maturana and Varela (1987) have said, “to live is to know”. Davis therefore uses ‘cognition’ to include unformulated knowledge and assumes that action is equivalent to conscious knowing which is part of enactivism. Unformulated knowledge is important as learning involves

resolving tensions between tacit and explicit knowledge, between emotional and reasoned actions, and between intuitive and calculated responses (Davis, 1996). He speaks of understanding implying sympathy, and meaning implying intent; and of meaning having an affective dimension that is often ignored because of the Cartesian knowing/feeling split.

Noddings (1992) concern with 'caring' is an examples of this affective aspect and is related to Heidegger's idea (cited in Mingers, 1995) of 'dasein' that is characterized by a feeling of concern; and 'solicitude' that suggests a caring and a concern for others.

In terms of curriculum Davis (1996) writes about curriculum anticipating. This means that the teacher works from good learning activities but must anticipate different ways that the lesson might move in response to the students' interactions while still linking with the major ideas that underpin the particular curriculum.

PART 2

My background

'How do we learn?' or 'how do we come to know?' These questions have interested me throughout my career in education. As a student in the 1960s at university and when I began teaching (as a teacher of mathematics) the dominant educational discourse was behaviourism which had superseded associationism and direct teaching for memory-based learning. I used this behavioural approach and often found myself teaching the subject rather than my students. Yet, when involved in non-academic activities, I focused on the students rather than on specific learning or behavioural objectives.

In the 1980s and 1990s constructivist ideas gained favour and I was inclined toward the radical version of constructivism (von Glasersfeld, 1995). This led me to focus on helping students construct meanings that make sense to us all rather than mastering particular objectives – still me teaching. At the same time I noted that constructivist ideas had hardly influenced the way that curriculum documents and textbooks were written, how lessons were conducted, or how assessment was organized.

My *a, b, c, ...* (associationism, behaviourism, constructivism, ...) stimulated an interest in theories and over the next twenty years I 'collected' learning theories. The result is a small (but open-ended) chart on my office

wall titled *What is the X-factor?* It is an alphabetic list of over a hundred theories related to learning and teaching. The only letter with no theories is *X*; hence the title of the chart. Under *E* there are twelve theories, one of which is *enactivism*.

With this list of learning theories I saw a parallel with the mathematics. Each theory was depended on assumptions (axioms) that were taken as the starting point. I came to see axioms not as *truths* or *self-evident facts*, but as assumptions; and in the same way that different axioms lead to different mathematics, so different assumptions lead to different learning theories. With over a hundred theories I concluded that:

- no theory represents ‘all’ the truth; and every theory contains ‘some’ truth as it would not become a theory without evidence to support it
- the theories consider teaching, learning and knowing in different ways that reflect structural or procedural ways of teaching and of thinking about knowledge.

While thinking about these theories and their underpinning assumptions I realized that in teaching I assumed many things that I was not aware of. This caused me to consciously go back to basics. As a teacher the epistemological question, ‘how do we know’, has always seemed important, but with I had begun to see it as inseparable from the ontological question concerning ‘the nature of being’.

Non-human knowing/learning

A breakthrough for me was to realize that humans are not special. As Maturana (1970) has written, *Living systems are cognitive systems and living as a process is a process of cognition. This statement is valid for all organisms, with and without a nervous systems*. I remembered learning in science about simple life forms that ‘respond to stimuli’ but for me this was not quite enough, the responses made by all living things always seemed to be intelligent.

Comparing non-human living things with humans – dinosaurs lived much longer; and most living things live without the clutter that we humans accumulate. I wondered about the young albatross, soon after it learns to fly it travels alone around the world and hardly touches land for three years, then returns to where it was born to mate, but how does it know what to do, and how does it know its way *home*? How does a penguin that

has been fishing know where its chick is in a penguin colony of thousands of birds? How has the crow (Marzluff, Angell, 2012) learnt to copy people in so many different ways? How does a bird know about the design and building of nests (Goodfellow, 2011)? How does the salmon that hatched in a river and swam to the sea know its way back to the same river to lay its eggs? Why do dogs hardly ever get lost? How do birds in flocks and fish in schools develop the ability to move together as though they were part of a single organism with a single mind? How do the bees in a hive or the ants in a nest all learn their specific roles and work together so cooperatively? How does a baby turtle know when it first hatches that it must go down the sand to the water? How does a plant know when to flower and how to react to its environment (Chamovitz, 2012)? I know that a plant has a chemical feedback system, but how does it learn, adapt, and co-emerge with its environment? Even bacteria and viruses seem to act intelligently.

All living things behave rationally, they seem to know – and ‘coming to know’ is inseparable from being alive.

Human knowing/learning

Humans, like other organisms, learn and know many things; and most were not learnt in school; indeed, for hundreds of years most people did not go to schools. We learnt to breathe (though perhaps a pat on our back after birth helped the process), we heard music and enjoyed some forms more than others, we ate food and preferred some flavours over others, we heard or read many words and sometimes thought we knew what they meant without ever being told. Some of this learning was subtle and we may not have been aware of the influences, but some seemed innate.

Similarly with schooling, much of our academic learning occurs outside class and takes time, for example

As a school student I was interested in geometry and learnt Pythagoras’s theorem, its converse, and the related theorems and converses when the angle was not equal to, or greater than, or less than a right angle. A year later in trigonometry I learnt the cosine rule. However, it was not until I started teaching these topics some six or so years later that I came to see that the cosine rule was in fact a complete summary of the eight geometric results.

Such learning was an emergent process, it partially occurred at a non-conscious level and it took a considerable time.

Cultural differences

Each of us has a world-view and language abilities, and while these were learnt partly at school they were also learnt informally as part of our enculturation; and these both influence our thinking. But different cultures have different influences on us. For example, in the west we think of 'self' as a physical reality, but from a Buddhist perspective self is a mental representation or construct, not an entity (Engler, 1984). With thinking Kelman (1958) suggests that the West takes as objectifying attitude while the East takes a subjectifying one; that Western cognition is interested in the objects of cognition, while Eastern cognition is interested in consciousness itself; and that Western languages are noun-oriented (making propositions about things) while Eastern languages are verb-oriented (making propositions about events). These differences tend to lead to dichotomies that may be problematic, these include the self/non-self or self/world splits, which lead to the subject/object, mind/body, and knower/known dichotomies (Davis, 1996). Such dichotomies have been reinforced by various traditions of individualism in the West (including Aristotelian philosophy, Judaic and Christian religions, and Cartesian thinking). The body/spirit split has been reinforced by the notion of a soul distinct from the body that has connotations of intelligence not being connected with the material body. But even in the west we have resistance to these – Merleau-Ponty (1962) rejected this bipolar way of thinking and the rational and empirical ways of knowing, instead he claims that *the body renders mind and world inseparable* and the body is *our means of belonging to our world*.

Another aspect of human learning that seems different for different cultures is the way that knowledge is handled, in the West we tend to compartmentalize it while in the East and within indigenous cultures it has traditionally been considered more holistically. Additionally, in the west we assume learning is the result of either being taught or being aware of through the senses, but in the chapter titled "Learning to be human again" Wolff (2001, 144-170) describes his experience of an alternative way of knowing. For me this 'developing an openness for direct awareness' seems similar to that of advanced practitioners of meditation from Eastern traditions and links with notions of intuition from Western philosophers.

Who am I?

Most of us have ideas about who we are, but are not aware of why we think whatever we think about ourselves. I am not referring here to our names or details of our families, but rather to more fundamental ontological question. Many of us from the west have an individualistic perspective, others are more family or community oriented, and a small number identify themselves as part of the environment. Such feelings about self are part of our world-views and are influenced by the dominant religious and philosophical influences in our societies and the language(s) we use.

These world-views are part of what we know, and knowing for Fromm (1978) is of two forms – knowledge (possessing facts) and knowing (with insight as part of being). Later Fromm (1993) discriminated between ‘to be aware’, ‘to know’, and ‘to be conscious of’, and said that while these are often thought of as synonymous, the root of ‘aware’ (the German *gewahr*) means ‘attention’ or ‘mindfulness’ which is different from ‘thinking about’. These ideas link with the Eastern influenced ideas of Krishnamurti (1954) who spoke of the need for awareness and self-knowledge which is not *thinking* and the need *to know ourselves* which means *to know our relationship with the world*. For me all these – awareness, mindfulness/meditation, insight, and intuition – are forms of coming to know that fit with enactivism, and I link them with contemplative thinking.

Common educational assumptions

To improve one’s practice as a teacher or as a learner one must question what one assumes about one’s practice. Some of the assumptions many of us make or have made as teachers or students include:

- ‘learning is the result of teaching’
- ‘teaching is necessary for learning’
- ‘immediately after learning a topic a student will understand it’
- ‘certain topics must be learnt by all students’
- ‘teachers and administrators know what students must learn’
- ‘all topics can be broken into sub-topics that can be taught sequentially’

‘a sequential subtopic must be mastered before moving to the next topic’

‘assessment is useful, has a positive influence, and reinforces learning’

‘that informal learning is of less value than school learning’.

My reaction to all of these is that each, like learning theories, may contain *some* truth, but they are slogans – we need to think more deeply about the nature of knowledge and learning, and question their validity when considering education.

Thinking within learning/knowing

In the past education seems to have emphasized knowledge, knowing, and experience; but knowing and being able to recall to me seems not enough. To engage with what one knows involves thinking and this seems to me to be part of the learning process that is too often neglected. Davis suggested that listening was important, and I agree with him that it is a deeper listening than normal that is required. However, listening is only one of the sense-based ways of coming to know, and it seems equally important that whenever we use sense-based knowing we need to be working at the deeper or hermeneutic level rather than merely at an evaluative or an interpretive level. All such hermeneutic engagement requires forms of thinking that are often ignored. Thus, for me, enactivism is concerned about the living/learning process and this involves a multiplicity of forms of thinking. From my perspective thinking involves six main and related forms: critical, creative, meta-cognitive, sensory-based, caring, and contemplative thinking. While each of these can be subdivided further, a synthesis of them rather than an analysis is probably more fruitful because all six forms are inter-related.

Critical, creative, and meta-cognitive thinking

The first three forms of thinking have traditionally been given some (though often inadequate) attention in education. Critical thinking including reasoning and logic and depends on assumptions that one either makes consciously or takes for granted, but too often the assumptions are

not made explicit. Creative thinking is an imaginative and open form of thinking that involves considering alternative perspectives and possibly imagining different assumptions, but often this is not considered relevant to subjects such as mathematics and science where it is in fact particularly relevant. Meta-cognitive thinking is the monitoring of ones thinking and while this occurs it is uncommon to see teachers consciously using strategies to encourage and develop metacognitive thinking strategies.

Sensory-based, caring and contemplative thinking

The other three forms of thinking seem to me to need even more attention. Sensory-based thinking involves making sense of information received through our senses but making sense requires alternatives to be considered and in many instances for sense made to be seen as tentative. For example, most children think the sky is blue, but what about at night, and what about from outer space – is the sky blue, or does it just seem to be blue on a fine day? Caring thinking links with emotions (unformulated knowledge, personal constructions, and actions, that are part of our knowing/being), and with our concern for self, for other people and life-forms, and for the world. With the increasing emphasis on the eco-system caring is being stressed more, but often in an unbalanced way so that we care for the things we like and ignore the many other things that are essential for our existence. And finally, contemplative thinking is the term I use for intuition, direct insight, awareness, and meditation. Contemplative thinking has always been to the fore in the East, but is too often not given adequate consideration in the west. Personally I think it is of extreme importance because it is largely through contemplation and direct insight that we come to see the connectivity of self and others and the world and then begin to see knowing and being as the same.

For me contemplative thinking links not only with unformulated knowledge and the intuition of some western philosophers, but also with the ‘mindfulness meditation’ of Buddhism and western mindfulness (Langer, 1989, 1997). I think of such contemplative thinking as ‘thought without thinking’. Such awareness or attunement to being alive was discussed by Varela, Thompson and Rosch (1991) in their bringing together of cognitive science and the Buddhist traditions. Nisker (1998) described it as *a non-interfering, nonreactive awareness* and said it was *pure knowing* without

the additional projections of ego or personality. He referred to being mindful as being like *shifting out of gear into neutral; disengaging the drive shaft of your personality, putting your survival brain or reactive self in idle*. Thus mindfulness complements cognitive knowing on which western education has concentrated. Nhât Hanh (1975) went further and wrote of five categories of mind (which are in themselves the mind), these are bodily and physical forms, feelings, perceptions, mental functionings, and consciousness; and he sees mindfulness as involving an integration of these aspects of mind.

Conclusion

Enactivism has pushed me to question the balance between academic knowing and knowing through developing an awareness of self (through forms of contemplative thinking). This awareness may be at numerous 'levels of consciousness' that are not normally associated with schooling; they are represented by eastern 'mindfulness' (Nhât Hanh, 1975) that was discussed by Varela, Thompson and Rosch (1991) and others. Historically awareness might be traced to the phrase 'know thyself' from the Greek temple in Delphi which links with traditional eastern ideas and with those from recent writers such as Krishnamurti (1954, 1955). In the western world mindfulness has links with Gestalt awareness (Perls, Hefferline, Goodman, 1951) and with pre-cognitive awareness from phenomenology (Merleau-Ponty, 1962). In the last twenty years the concept resonates with reflection (Schön, 1983), mindfulness (Langer, 1989, 1997), disciplined noticing (Mason, 1993), and the participatory consciousness (in research) of Heshusius (1994). These ideas cover a range of ways of knowing from non-cognitive to cognitive, and the emphasis varies from experiential to academic. I see enactivism as not creating dichotomies between non-cognitive and cognitive or between experiential and academic, but as ensuring that complementary ways of knowing are all given attention and credit.

Our challenge as educators is to explore these other ways of knowing and learning. The ideas within enactivism link with ideas that have been explored in the past but need further exploration. For me these ideas imply a shift from teaching to learning that also involves ensuring that schools interpret such shifts in cross-cultural ways that involves notions from east and west.

Just as I started with some of the criticisms of constructivism, so enactivism will no doubt be critiqued. This paper is my interpretation of the theory and acknowledging that my interpretation may be inadequate, I hope that readers will suspend their judgement of enactivism until they have delved deeper into the literature and considered the theory for themselves.

Enactivism presents a challenge to teachers as their question, *how should I teach?* remains partially unanswered. Enactivism made me rethink my teaching. I no longer focus on teaching or providing information, but rather on learning. I try to provide a climate for enquiry, for sharing, and for thinking. My focus is on offering possibilities for students to be aware of their thoughts, and to ensure that my ideas do not dominate. My work has shifted from telling to questioning.

Author's Presentation: Andy Begg is Associate Professor at Auckland University of Technology, New Zealand.

References

- BATESON, G. (1972), *Steps to an ecology of mind*, New York, NY, Ballentine Books.
- BELENKY, M., CLINCHY, B., GOLDBERGER, N., TARULE J. (1986), *Women's Ways of Knowing: The Development of Self, Voice and Mind*, New York, NY, Basic Books.
- CAPRA, F. (1996), *The Web of Life: a new synthesis of mind and matter*, London, England, Harper Collins.
- CHAMOVITZ, D. (2012), *What a plant knows: a field guide to the senses*, New York, NY, Scientific America/Farrar, Strauss and Giroux.
- DAVIS, B. (1996), *Teaching Mathematics: Towards a Sound Alternative*, New York, NY, Garland Publishing.
- DAVIS, B., SUMARA, D., KIEREN, T. (1996), "Cognition, co-emergence, curriculum", *Journal of Curriculum Studies*, 28(2), pp. 151–169.
- DAVIS, B., SUMARA, D., LUCE-KAPLER, R. (2000), *Engaging minds: learning and teaching in a complex world*, New Jersey, NJ, Lawrence Erlbaum Associates.
- ENGLER, J. (1984), "Buddhist psychology: contributions to Western psychological theory", in A. MOLINO (Ed.) (1998), *The couch and the tree: dialogues in psychoanalysis and Buddhism*, New York, NY, Farrar, Straus & Giroux.
- FROMM, E. (1978), *To have or to be?*, London, England, Jonathan Cape.
- (1993), *The Art of Being*, London, England, Constable.
- GADAMER, H.G. (1990), *Truth and method*, New York, NY, Continuum (cited in Davis, 1996).

- GILLIGAN, C. (1982), *In a different voice: psychological theory and women's development*, Cambridge, MA, Harvard University Press.
- GOODFELLOW, P. (2011), *Avian architecture: how birds design, engineer and build*, New Jersey, NJ, Princeton University Press.
- GUNARATANA, H. (1991), *Mindfulness in Plain English*, Boston, MA, Wisdom Publications.
- HESHUSIUS, L. (1994), "Freeing Ourselves from Objectivity: Managing Subjectivity or Turning Toward a Participatory Mode of Consciousness", *Educational Researcher* 23(3), 15–22.
- KELMAN, H. (1958), "Psychoanalytic thought and Eastern wisdom", in A. MOLINO (Ed.) (1998), *The couch and the tree: dialogues in psychoanalysis and Buddhism*, New York, NY, Farrar, Straus & Giroux.
- KRISHNAMURTI, J. (1954), *The First and Last Freedom*, London, England, Victor Gollancz.
- (1955), *Education and the Significance of Life*, London, England, Victor Gollancz.
- LANGER, E. (1989), *Mindfulness*, Reading, MA, Addison Wesley.
- (1997), *The Power of Mindful Learning*, Reading, MA, Addison Wesley.
- LOVELOCK, J. (1979), *Gaia: a new look at life on earth*, Oxford, England, Oxford University Press.
- MARZLUFF, J., ANGELL, T. (2012), *Gifts of the crow: how perception, emotion, and thought allow smart birds to behave like humans*, New York, NY: Free Press.
- MASON, J. (1993), "Learning from experience in mathematics", in D. BOUD, R. COHEN, D. WALKER (Eds.), *Using Experience for Learning*, Buckingham, England, Society for Research into Higher Education/Open University Press, 113–126.
- MATURANA, H. (1970), *Biology of Cognition*, Biol. Computer Lab. Research Report, 9.0, Urbana, IL, University of Illinois. (Reprinted in Maturana and Varela, 1980).
- MATURANA, H., VARELA, F. (Eds.) (1980), *Autopoiesis and Cognition: The Realization of the Living*. Dordrecht, Germany, Reidel.
- (1987), *The Tree of Knowledge: The biological roots of human understanding*, Boston, MA, Shambala Press.
- MERLEAU-PONTY, M. (1962), *Phenomenology of Perception*, London, England, Routledge and Kegan Paul.
- MINGERS, J. (1995), *Self-Producing Systems: Implications and Applications of Autopoiesis*, New York, NY, Plenum Press.
- MOLINO, A. (Ed.) (1998), *The couch and the tree: dialogues in psychoanalysis and Buddhism*, New York, NY, Farrar, Straus & Giroux.
- NHẬT HANH, THÍCH (1975), *The Miracle of Mindfulness: A Manual on Meditation (Revised Edition)*, Boston, Beacon Press (*Phép la của su tinh thuc*, translated by Mobi Ho).
- NISKER, W. (1998), *Buddha's Nature: who we really are and why this matters*, London, England, Rider/Random House.

- NODDINGS, N. (1992), *The Challenge to Care in Schools*, New York, NY, Teachers College Press.
- PERLS, F., HEFFERLINE, R., GOODMAN, P. (1951), *Gestalt therapy: Excitement and Growth in the Human Personality*, Harmondsworth, England, Pelican Books.
- ROSZAK, T., GOMES, M., KANNER, A. (Eds.) (1995), *Ecopsychology: Restoring the earth, healing the mind*, San Francisco, CA, Sierra Club Books.
- SCHÖN, D. (1983), *The Reflective practitioner: How professionals think in action*, New York, NY, Basic Books.
- SESSIONS, G. (Ed.) (1995), *Deep ecology for the 21st century*, Boston, MA, Shambhala Publications.
- VARELA, F. (1992), "Whence Perceptual Meaning? A Cartography of Current Ideas", in F. VARELA, J.-P. DUPUY (Eds.), *Understanding Origins: Contemporary Views on the Origin of life, Mind and Society*, Dordrecht, Germany, Kluwer.
- VARELA, F., THOMPSON, E., ROSCH, E. (1991), *The Embodied Mind: Cognitive Science and Human Experience*, Cambridge, MA, Massachusetts Institute of Technology Press.
- VON BERTALANFFY, L. (1968), *General System Theory*, New York, NY, Braziller.
- VON GLASERSFELD, E. (1995), *Radical constructivism: a way of knowing and learning*, London, England, Falmer Press.
- WOLFF, R. (2001), *Original wisdom: stories of an ancient way of knowing*, Rochester, VT, Inner Traditions.