Transformative Learning and the Challenges of Complexity [*]

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Introduction

Transformative learning is "[…] *an approach to teaching based on promoting change, where educators challenge learners to critically question and assess the integrity of their deeply held assumptions about how they relate to the world around them.*" (Mezirow & Taylor, 2010, p.xi). The study of transformative learning itself is grounded in systems of thoughts (e.g., behaviorism, cognitivism, constructivism, feminism, Marxism, positivism, post-structuralism, psychoanalysis, structuralism, systems theories, etc.) characterized by 'deeply held' epistemic assumptions. Each of these paradigms defines and legitimates how knowledge should be produced in order to establish some kind of 'truth' about individual and collective learning and transformation. Each of them also defines what kind of 'error' should be avoided in the scientific process. As practitioners, the way we conceive our educational practice is strongly influenced by the epistemic assumptions that frame such systems of thought. As researchers, our inquiry is determined by methodologies that are rooted in one or another of these paradigms. As 'transformative educators,' 'challenging assumptions' is at the core of what we promote among

[*] Reference : Alhadeff-Jones, M. (2012). Transformative Learning and the Challenges of Complexity. In E.W. Taylor, P. Cranton & Associates, *Handbook of Transformative Learning: Theory, Research and Practice* (pp.178-194). San Francisco: Jossey-Bass

learners, despite of the fact that questioning the legitimacy of the paradigms that frame our own educational practice and research is not something that we often consider.

In this chapter, I discuss some implications inherent to theories of complexity, because I believe, as many other educational theorists currently do (e.g., Ardoino, 2000; Banathy & Jenlink, 1996; Clénet & Poisson, 2005; Complicity: An International Journal of Complexity and Education; La Pensée Complexe en Recherches et en Pratique*,* 2008; Morin, 1999; Osberg & Biesta, 2010; Paul & Pineau, 2005; Sinnott, 2003) that they provide us with a set of assumptions and principles that are needed in order to challenge some significant limitations associated with dominant systems of thought. Located at the intersection of philosophy, physics, biology and human sciences, the paradigm of complexity formulated by Morin (1977/1992; 1977-2004/2008; 1990/2008, 2007) indeed criticizes contemporary sciences and philosophies that compartmentalize and reduce the way we understand ourselves and the world around us, without critically reflecting on the limitations they introduce.

Interpreting the way knowledge is produced as a 'complex' phenomenon, means that it embraces or comprehends heterogeneous elements plaited together, interwoven in a way that is hardly apprehended by the mind, not easily analyzed or disentangled (Ardoino, 2000; Alhadeff-Jones, 2008a). In the contemporary context, most of us have access to a sum of knowledge (scientific or not) so abundant that a major challenge we face is to learn to identify not only what is relevant to know, but also how to organize heterogeneous explanations and interpretations so that they remain meaningful. As a learner, practitioner or researcher, dealing with complexity requires one to systematically challenge the way everyday situations and scientific problems are reduced. Indeed, a complex way of thinking "[…] *represents a shift away from the simplifying, reductionist approach that has traditionally shaped scientific enquiry.*" (Morin, 1996, p.10).

In order to illustrate what is at stake in the definition and in the development of a complex epistemology of transformative learning, this chapter introduces the paradigm of complexity and explores six challenges that appear particularly illustrative with regards to the advance of research and practices related to transformative learning.

Introducing the Paradigm of Complexity

Throughout the history of modern sciences, there has been several ways to conceive the complexity of problems tackled by scientists (Weaver, 1948). From the 17th to 19th century, it was conceived following the models offered by classical physics: valorizing objectivity, causal explanation, quantitative data and certainty. According to this "paradigm of simplification" (Morin, 1990/2008), which still grounds dominant scientific paradigms and organizes scientific disciplines, complex problems have to be tackled by their reduction to more simple issues, explained or solved independently and successively. Since the second half of the 19th century, several discoveries made in physics contributed to the emergence of another paradigm that considers disorder as a fundamental part of natural phenomena (for instance, physical matter appeared to be made of disordered particles and the universe to be born from initial chaos). The forms of order observed in the physical and biological world are born from disorder and in some ways dominate it. However, the emergence of systems (from a swirl of water to life itself) organizing order and disorder does not follow a simple causality. Complex phenomena are predictable and unpredictable at the same time. For instance, it is easy to predict that water heated up is going to boil, however it is impossible to predict where in the pot the boiling will start. They combine antagonistic, complementary and contradictory principles such as fluctuation and stability, linearity and non-linearity, randomness and non-randomness. In addition,

discoveries made in the early 20th century brought scientists to acknowledge the fact that the study of complex phenomena cannot be done without taking into consideration the role of the observer in the way complexity is described (Morin, 1977/1992). The recognition of complexity appears therefore at the roots of a new kind of scientific explanation, which perceive simplicity as a specific provisional phenomenon. If complication refers to the idea of an intricate situation waiting to be disentangled, complexity supposes rather the fundamental non-simplicity of studied phenomenon (Ardoino, 2000) requiring the acknowledgment of researchers' own uncertainty about the way they conceive it. As formulated by Bachelard (1934/2003, p.152, my translation): "*There is no simple idea, because a simple idea* […] *is always inserted, to be understood, in a complex system of thoughts and experiences*." From the 1940s until today, several theories have emerged in order to provide scientists with resources helping them to question and understand the relationship between order and disorder among complex phenomena (for a more exhaustive overview, including full bibliographical references, see Alhadeff-Jones, 2008a).

Considering research on transformative learning through these contributions requires one to navigate between at least three intertwined levels. The first one is conceptual and theoretical. It involves reconsidering one's understanding of transformative learning based on a renewed vocabulary (including chaos, disorder, emergence, non-linearity, self-organization, systems, etc.) The second one is epistemological. It requires one to revisit the way one conceives scientific activity and the processes through which knowledge is produced through the inclusion of a set of assumptions legitimizing innovative logics and methodologies (e.g., complex causalities, dialogical principle, etc.) (Morin, 1977-2004/2008; 1990/2008). The third level requires researchers and practitioners to reflect more systematically on the personal and institutional

dynamics shaping the way research is conducted and knowledge created (Alhadeff-Jones, 2010; Montuori, 2005, 2010; Paul & Pineau, 2005).

Revisiting Transformative Learning through the Paradigm of Complexity

In order to revisit the way knowledge is produced about transformative learning according to a complexivist perspective, the following sections explores six challenges that represent some of the core issues associated with the paradigm of complexity.

Challenge #1: Negotiating the Tensions between Generality and Singularity. Assuming that transformative learning is a complex process invites one to consider it as both predictable, according to determined general principles (e.g., the crucial role of disorienting dilemma, dialogue, etc.), and unpredictable (e.g., the randomness of the experience of epiphany). Educational practices and theoretical contributions informing our understanding of transformative learning are therefore caught into a double bind shaped by the need to generalize and abstract the way transformative learning is interpreted and promoted, as well as the necessity to acknowledge its contingency. On one hand, transformative learning grows as a dominant teaching paradigm, which is becoming a standard of practice in a variety of disciplines and educational settings, as well as the focus of a growing amount of scientific research suggesting some kind of universality. On the other hand, individual experience and an awareness of the context of learning remain two essential components that frame a transformative approach to teaching (Mezirow & Taylor, 2010). The respect of this tension is at the core of a complex understanding of transformative learning. From an epistemological perspective, during the past twenty years, the influence of post-modern and post-structuralist critiques have challenged the

claim of universality legitimizing many educational contributions, including initial writings on transformative learning theory (e.g., Mezirow, 1999; Usher, Bryant & Johnston, 1997; Pietrykowski, 1996). Nevertheless, traditional (e.g., Mezirow, 1991) and radical 'post-modern' interpretations (Bagnall, 1999) both tend to reduce the complexity that can be found in transformative learning. The former focuses on the search for the underlying order shaping transformative learning experiences and the identification of a totalizing discourse, which tends to reduce the diversity of variables determining real-life experience in order to highlight universal characteristics. At the opposite, the latter privileges the reintroduction of disorder into educational practice and theory, mainly by focusing on what has been neglected, forgotten, repressed, rejected, disqualified, excluded or silenced by traditional methodologies (Rosenau, 1992). A complex conception of learning and research encourages one to embrace such an antagonism instead of reducing it. It requires researchers and practitioners to continuously nurture the tensions between what makes the universality and the singularity of transformative learning. For instance, in spite of the relevance of life history and biographical approaches (e.g., West, Alheit, Andersen & Merrill, 2007) regarding the promotion of perspective transformation in adult and higher education, the transformative dimension inherent to such methods remains often uncertain and always contingent to the constitution and the dynamics of the group as well as the institutional environment surrounding it (e.g., status and prior knowledge of participants, mutual trust, power dynamics, etc.) (Dominicé, 2000). Considering a process of transformation according to the 'catastrophic' (literally meaning overturning) and 'chaotic' nature characterizing 'non-linear phenomena' (exemplified through the 'butterfly effect') requires learners, researchers and practitioners to privilege interpretations starting from the local and the singular (Morin, 1977-2004/2008; 1990/2008). In order to be generalized, the meaning of a transformative

approach to education requires also the inclusion of the micro and macro historical contexts of the training (e.g., individuals, group, institution and country's history) in order to grasp the extent of its transformative effects (Lani-Bayle & Mallet, 2010). Considering the increasing expectations formulated by practitioners and institutions favoring 'ready-made tools', 'standardized' tests and methods framing their research and training, such a position is a challenging one. It questions what kind of resources are required in order for practitioners and researchers to (learn to) claim the value of a paradoxical perspective on transformative learning looking for generality and embracing at the same time the singularity of every learning event.

Challenge #2: Reconsidering the Linearity and the Non-linearity of Transformative Learning. Individual perspective transformation is most often explained as being triggered by a significant personal event. However, there is still little understanding of why some disorienting dilemmas lead to a transformation and others do not (Taylor, 2000). This fact encourages one to revisit common assumptions about the type of causality involved in transformative learning (Sinnott, 2003). The principle of 'complex causality' (including mutual causalities, feedback loops, etc.) informs the understanding of self-regulating systems (Morin, 1977-2004/2008). It breaks with the principle of linear causality stressing the fact that cause acts on its effect, as effect acts on its cause through positive and negative feedbacks (exemplified by the thermostat's mechanism of temperature regulation). Transformative learning is often described through the linear succession of different phases (disorienting dilemma, self-examination, critical assessment of assumptions, recognition that one's discontent and transformation are shared, exploration of new options, planning action, acquisition of knowledge and skills, trying new roles, building self-confidence, reintegration of the new perspective, etc.) (Mezirow & Associates, 2000). Each of these phases is

made of multiple changes affecting the learner and her/his environment. Each steps involves a large variety of outcomes (e.g., emotions, beliefs, behaviors, etc.) that impact the other phases of the transformative process. The principle of complex causality invites one to pay attention to theses mutual relationships, not only through a linear, but also through circular dynamics. It stresses the role of the positive and negative reinforcements (e.g., radicalization and inhibition) that regulate the emotions, beliefs and behaviors, at and between each stage of the process. Beyond the idea of regulation, complexity theories also introduced the notion of 'recursive loop' in order to understand and describe processes of 'self-organization' and 'self-production' (Morin, 1977/1992). It refers to a generating loop through which products and effects are themselves producers of what produces them. Such a principle can be observed for instance in social life: society produces who we are at the same time that we contribute to what society becomes. At an individual level, recursive loops characterize 'vicious and virtuous circles' often described by learners or practitioners when they interpret their personal or professional experiences and their self-development. Transformative learning emerges from what each stage of its own development produces (e.g., dilemma, reflection, awareness, community, alternatives, new knowledge, feelings, identity, etc.) A critical incident (e.g., traumatic event) may retrospectively appear at the source of a transformation, but transformative learning can also be triggered by the repetition of the same unsatisfactory experience through multiple cycles, building up a critical mass, leading one day to a 'bifurcation' in one's own way of being. For instance, such cycles may characterize the evolution described when someone is finally able to quit smoking after several unsuccessful attempts. Recursive loops stress the relationship between circularity, repetitions and innovation involved in the process of transformation. Paying attention to these processes provides resources to interpret the generative dynamics associated with transformative

learning according to linear and non-linear developmental perspectives (Sinnott, 2003). It is congruent with studies establishing the evolving and spiraling nature of transformative learning (e.g., Coffman, 1989; Elias, 1993; Holt, 1994, Laswell, 1994; Neuman, 1996; Saavedra, 1995; Taylor, 1994, cited in Taylor, 2000). Such a perspective is challenging because it claims that single causes explaining the presence or the absence of transformative learning are the exception, not the rule. Transformative learning is produced and/or inhibited by the multiple changes that are constitutive of the learner's own evolution. According to this assumption, the evaluation and description of transformative learning becomes therefore much more difficult to anticipate, describe and evaluate.

Challenge #3: Conceiving the Emerging Nature of Transformation through its Levels of Organization. Several streams of research have approached the complexity of transformative learning through holistic and interdisciplinary perspectives favoring open spaces for the marginal, the liminal, the unconscious, the embodied, the affective, stressing the importance of promoting an ecological vision, and highlighting the interconnectedness between individuals and their social and natural environment (e.g., Davis-Manigaulte, Yorks, & Kasl, 2006; O'Sullivan, 1999; O'Sullivan, Morrell & O'Connor, 2002). Despite such contributions, the mutual influences between context, culture and transformative learning remain only marginally looked at (Taylor, 2000) and one can still regret the lack of a sound connection between individual perspective transformation and social change (Finger & Asùn, 2001). Embracing a holistic perspective and the complexity of the relationships between individual and collective transformations requires one to establish strong connections between psychological, social, anthropological, economical and political theories. It also requires one to systematically bind knowledge of parts to

knowledge of the whole(s). Adopting a systemic and organizational perspective encourages one to conceive transformative learning through the new properties, which emerge from a whole, influencing its environment and recursively determining its own components (Morin, 1977-2004/2008). It privileges research design that articulates multiple levels of analysis (individual, organizational, institutional, societal, etc.) in order to question what characterizes their mutual relationships and how they are intertwined with each other. For instance, in their research on power dynamics in a corporate multinational company, Pagès, Bonetti, de Gaulejac and Descendre (1979) articulated three theoretical frameworks (marxism, psychoanalysis and psychosociology) in order to interpret the correspondences between social organization and the unconscious structures of the individuals' personalities. They demonstrated that, in order for individuals and an organization to get transformed, it is required to understand both the unconscious ties that attach individuals to the collectivity, and the organizational policy implemented in order to reinforce such ties. Adopting a systemic and organizational perspective also invites one to consider the different temporalities shaping transformative learning and how they are intertwined with each other (Alhadeff-Jones, Lesourd, Roquet & Le Grand, 2011). For instance, the international survey coordinated by Lani-Bayle and Mallet (2010) questions and differentiates the relationships between personal transformation and the different temporal frames shaping individual and collective experience (i.e., biological age, generational belonging, local and national history). Considering transformative learning as an emergence involving several levels of organization simultaneously is challenging because it requires researchers and practitioners to consider relationships, interactions and mutual interdependences between phenomena that are usually fragmented, compartmentalized and simplified by scientific theories and disciplines.

Challenge #4: Beyond Diversity of Perspectives, Recognizing Heterogeneity and Multireferentiality. The literature on transformative learning includes a growing number of contributions originating from heterogeneous academic disciplines (from sociology to psychology and neurosciences). From an epistemological perspective, such a process of inclusion is often grounded in misrepresentations of adjacent disciplines aiming to simplify their contributions and preserve the coherence of one's own field of study (Pagès, 2002). For instance, according to Finger and Asùn's (2001), Marxists' criticism of Mezirow's theory claiming that it has no theory of social action and social change (Collard & Law, 1989; Welton, 1995) should not be conceived as a political question but rather as an epistemological one: "[…] *Mezirow has not really integrated Freire's and Habermas's political analysis; this has led him to focus* […] *on the way adult learners adapt to rather than criticize society. As a result, Mezirow simply assumes, like the* [humanist tradition in adult education] *that perspective transformation and adult learning will automatically lead to social action and social change*." (Finger & Asùn, 2001, p.59). Acknowledging how much a complex way of doing research is embedded in the articulation between academic disciplines, Ardoino's contribution around the concept of 'multireferentiality' stresses the need to identify what is constitutive of their heterogeneity: "*A multireferential approach promotes the adoption of a plural way of reading its objects (practices or theories), adopting various angles and involving as many specific looks [regards] and languages, appropriate to the required descriptions, based on distinct systems of references, acknowledged as explicitly irreducible to each other, in other words as heterogeneous.*" (Ardoino, 1993, p.15, my translation). Multireferentiality requires that researchers identify systematically the cores, boundaries, as well as the rules, logics and assumptions specific to the different disciplines, theories and concepts used to interpret transformative learning. It has been

initiated for example around the concepts of 'self' (Dirkx, 2007), 'critique' (Alhadeff-Jones, 2007a, 2007b, 2010; Brookfield, 2000) or 'complexity' itself (Alhadeff-Jones, 2008a) in order to nuance their use. The acknowledgment of multireferentiality is required in order to avoid the pitfalls of eclecticism associated with the incompatible mix of philosophies and epistemologies sometimes denounced in the literature on transformative learning (Finger & Asùn, 2001). Indeed, a complex method does not aim to merge, aggregate, or integrate theories in order to build unifying syntheses. It rather privileges the conception of their mutual relationships based on the recognition of their boundaries (Pagès, 2002). From a practical point of view, for instance, such a perspective invites practitioners and researchers to distinguish what is constitutive of heterogeneous realities (e.g., biological, psychic or social ones) in order to interpret their relationships. Pagès (ibid.) mentioned for example his collaboration with a sociologist in order to interpret collectively the life histories of patients that he was following in psychotherapy. The understanding of transformative learning appears complexified by the articulation of two roles acknowledged as distinct: the sociologist was indeed raising questions related to the way the participants were interacting with objective social realities (including places, people, family names, money, etc.); according to his psychoanalytical background, Pagès was asking participants to be in touch with unconscious memories. Exploring complexity does not only challenge disciplinary boundaries. It also requires researchers and practitioners to acknowledge and understand the epistemological assumptions shaping how knowledge is created and organized among heterogeneous disciplines (Montuori, 2010).

Challenge #5: Reconsidering the Relationship between Autonomy and Dependence. In spite of the value attributed to them, traditional conceptions of critical reflection, critical thinking, and

the engagement in dialogue, as processes located at the core of transformative learning theory, are regularly contested because of their paradoxical effects. On one hand, they may ground an individual process of empowerment, which can be experienced as emancipatory. On the other hand, the narrative and the group dynamics that shape critical practices raise resistances and may also be interpreted as constraining and potentially alienating (Alhadeff-Jones, 2007a, 2010; Ellsworth, 1992; Schugurensky, 2002; Usher, Bryant & Johnston, 1997). For instance, research referring to the use of personal narrative in higher education shows how the process of writing one's own life history can trigger critical insights contributing to increase the learner's autonomy. At the same time, some participants may experience this exercise and the process of sharing their narratives in group as overwhelming or threatening (Dominicé, 2000). In addition, transformative learning may be promoted in formal institutions where the established knowledge, power base and institutional dynamics require learners to conform to conventions and procedures that can be opposed to the learners' own preferences. The critical aim of the training may therefore be challenged by institutional and program policy and procedures (e.g., admission requirements, lack of flexibility in the program approval policies, lack of faculty resources, kinds of research sanctioned, work requirements overload, lack of flexibility in the curriculum, etc.) (Bitterman, 2000). In order to understand how an opportunity for transformative learning can become disempowering, one has to revisit the assumptions framing common conceptions of 'control' and 'autonomy'. Among others, the 'autonomy-dependence' principle formulated by Morin (1990/2008) focuses on the property characterized by the fact that what makes a system (e.g., a person, a group, a theory, etc.) self-sufficient and autonomous is also what makes it dependent. Indeed, the case – common in the United States – of students getting in debt in order to cover the tuition of an academic degree – that may or may not be transformative – illustrates

well the ambivalent nature of education as a source of autonomy and dependence. The autonomy-dependence principle encourages one to systematically consider transformative learning as a manifestation of the complex interplay between complementary, contradictory and antagonistic forms of self and mutual control (embedded in individuals, groups, institutions, etc.) Acknowledging and going beyond a critique of the alienating dimension of educational institutions (Illich, 1971), this principle brings researchers and educators to systematically question their contribution to both, the learners' autonomy and dependence, in order to critically assess and negotiate such a tension without reducing it. Doing so is challenging because it nuances the benefits (in terms of autonomy) usually associated with transformative education, and also because it stresses ethical dilemmas that cannot be easily solved.

Challenge #6: Reintroducing the Knower in any Knowledge.

Recognizing transformative learning as an individual or collective, brief or long-lasting emergence is a matter of convention. Any complex system requires a subject (e.g., the researcher) who isolates it, cuts it up, qualifies it, hierarchizes it, based on selective interests and the cultural and social context of scientific knowledge (Montuori, 1993; Morin, 1977–2004/2008). In educational sciences, 'systems' always involve human factors referring to meanings, values, behaviors and histories, which are never indifferent to the researchers who study them, may it be consciously or not (Devereux, 1967). Researchers and practitioners are therefore required to position their own contribution based on the expression of the filiations framing one's own beliefs, assumptions and practices. It requires one to constantly clarify the epistemological, ethical and existential issues, as they appear influenced by unconscious, emotional, cognitive, social, historical or political determinants. In France, Lourau (1997)

defined as ‘implication’ every aspect that intellectuals refuse, consciously or not, to analyze in their practice. Ardoino (1993) establishes a distinction between ‘libidinal implications’ (inherent to unconscious psychic life) and ‘institutional implications’ (inherent to the social, economical, and political status, ideology, etc.)

In North-America, close to the concept of ‘institutional implications’, the notion of ‘positionality’ describes how the researcher/practitioner’s own class, ethnicity and gender influence one’s own research and educational practice (e.g., Johnson-Bailey, 2004; Taylor, Tisdell & Hanley, 2000). Considering researcher and practitioner's implications corresponds to the heuristic intuition that it can be as much a source of knowledge than a factor of distortion (Ardoino, 2000). For instance, from an educational perspective, paying attention to psychological implications, such as ‘transference’ and ‘counter-transference’ (Devereux, 1967) allows one to understand how a subject (e.g., learner, trainer, researcher, etc.) actualizes and projects onto another person unconscious desires (seduction, aggressiveness, fear, etc.) replicating relationships from her/his own past life (e.g., with parents or siblings) and influencing her/his own learning. For an educator, interpreting one’s own ‘counter-transference’ (i.e., reactions experienced in echo to learners’ transference) is a valuable strategy in order to understand the role played by attraction, repulsion, suspicion or competition, as behaviors originating in the past, whose actualization during the training stimulates or prevents transformative learning among learners. From a research perspective, Devereux (1967) demonstrated how traditional scientific methods (including tests) tends to reduce the understanding of the role played by the researcher’s psychological implications, by facilitating the denial of emotional overload (e.g., anxiety, fear) involved in the study of phenomena that they may perceive as traumatic or taboo (e.g., involving sexual or violent behaviors).

Questioning implications and positionality requires one to challenge the normative dimension of research and education. It appears therefore as a delicate ethical and political operation, raising numerous pitfalls. On one hand, it can be distorted by objectivist paradigms of research, through its integration as additional 'pseudo-transparency' aiming to identify specific 'bias'. On the other hand, it can become inoperative, when it is used to legitimize a hyper-subjectivist conception incompatible with scientific pretentions (Lourau, 1997.) Taking systematically in consideration practitioners and researchers' implications is difficult, not only because it challenges the assumption of neutrality deeply rooted in positivist epistemology, but also because it requires the development of research and pedagogical methods that valorize the practitioner's self-inquiry.

The Challenges of Complexity as Sources of Transformative Learning

Several traditions of research conceive transformative learning through the adoption of 'non-dualistic', 'dialectical', or 'post-formal' ways of thinking reframing the way conflicting issues are understood (e.g., Basseches, 1984; Belenky, Clinchy, Goldberger, & Tarule, 1986/1997; Mezirow, 1991; Sinnott, 2003). These approaches invite one to bring together two notions, concepts, options or assumptions which seemingly exclude each other, but which appear as an integral part of the same reality. By assuming in a rational way the association of contradictory or even paradoxical views, a deeper transformation of the learner's assumptions is expected. Such theoretical contributions are crucial in order to understand the adoption of more complex and inclusive worldviews (Alhadeff-Jones, 2007b). As it has been discussed above, the six challenges described in this chapter introduce various forms of antagonisms, contradictions and complementarities (dealing with singularity and generality, predictability and unpredictability, linear and circular causalities, considering the relationships between levels of organization,

transgressing and respecting disciplinary borders, giving autonomy and creating dependence, referring to subjectivity and looking for objectivity, etc.) They introduce tensions, which are constitutive – among other dimensions – of a complex conception of transformative learning. It appears therefore that the recognition of some of the challenges raised by the idea of complexity carries by itself a potential for transformation. In other words, conceiving the complexity of transformative learning may require and/or trigger transformative learning. Such circularity characterizes the recursive dimension of a complex way of thinking.

Stressing the importance of discursive principle privileging the association of complementary, concurrent and antagonistic notions with each other, the paradigm of complexity encourages one to go one step further. It does not only value non-dualistic ways of thinking, it requires the positioning at the center of the research process of the deep ambivalences, contradictions and paradoxes experienced not only by the learners, but also by the practitioners and researchers (Morin, 1977–2004/2008). Instead of reducing contradictions, the adoption of a 'dialogical principle' requires the researcher to question what can be learned from the study of paradoxes and double binds framing both transformative dynamics and the scientific processes aiming to study them (Alhadeff-Jones, 2007b; Bitterman, 2000; Montuori, 2005, 2010). It suggests therefore that a complex way of thinking about education and research involves systematically some levels of transformation, inherent to the action of challenging the assumptions framing traditional educational and research practices.

Transformative Learning as an Object of Study and as a Dimension of Research

As Morin (1990/2008) formulates it, complexity cannot be something which would be defined in a simple way and would replace simplicity. Complexity is a word-problem and not a word-

solution. It does not provide us with any kind of standardized tools or methods. It requires ingenuity and creativity (Montuori, 2005, 2010).

> Thinking in terms of complexity is clearly not a mode of thought that replaces certainty with uncertainty, separation with inseparability, and logic with all kinds of special exceptions. On the contrary, it involves a constant toing and froing between certainty and uncertainty, between the elementary and the global, between the separable and the inseparable. The aim is not to abandon the principles of classical science – order, separability and logic – but to absorb them into a broader and richer scheme of things. […] Linkage must be made between the principles of order and disorder, separation and connection, autonomy and dependence, which are at one and the same time complementary, concurrent and antagonistic. (Morin, 1996, p.14)

Challenging theoretically and practically our conceptions of transformative learning according to a complexivist perspective, requires one to explore the ways this field is interpreted and defined, according to a reflexive epistemology. It suggests indeed the development of a systematic skepticism, which continuously questions the legitimacy of one's own teaching and research assumptions. Aiming to do so is an ambitious project. It requires navigating through heterogeneous theories, involving process of translation between foreign disciplines and unknown natural and conceptual languages. Dealing with their complementarities, contradictions and antagonisms requires the adoption of ways of knowing that cannot be taken for granted. Embracing a complex epistemology is a challenging process intellectually, but it also involves every dimension of one's own being (Alhadeff-Jones, 2007a, 2007b; La Pensée Complexe en Recherches et en Pratique, 2008; Heshusius & Ballard, 1996; Montuori, 2005, 2010). For researchers and practitioners as well, a complex way of thinking suggests the conception of the scientific process as a continuous learning, source of potential transformations, grounded in the experience of doing research itself. From an educational perspective, a complex way of thinking may be understood as a method of learning involving human error and uncertainty (Morin, 1977/1992). It involves taking into consideration both the individual and collective experiences

grounding any activity of research, and – more deeply – the transformative learning processes associated with them (Alhadeff-Jones, 2007a, 2007b, 2008b; Montuori, 2005, 2010).

The good news for researchers working on transformative learning is that the growing interest in academia and in education for transdisciplinary approaches informed by the idea of complexity (Montuori, 2010; Paul & Pineau, 2005) constitutes a new field of exploration allowing us to study how we learn – or not – to question the assumptions framing our worldviews. There is no doubt that transformative learning theory can play a significant role in the understanding of current academic and scientific transformations triggered by the need to develop an intelligence of complexity (Morin, 1990/2008). But there is no certainty neither about the way this field of study will contribute to the advance of science and education during the next decades… The best way to find out may be therefore to sustain a systematic effort aiming to confront our own transformation, as we try to conceptualize the transformations we are studying.

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