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TRIALS OF THE RHIZOMATIC LEARNER

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ABSTRACT:

How should educators respond to the whole phenomenon of 'digital learning'? This question has been in vogue for the past twenty years or more and there is a need for a regular renewal of this question as societies change. This article will draw on some post-structuralist writing, particularly Deleuze and Guattari, to try to understand better the divide between the optimistic account and the pessimistic account of the effect of ICT on teaching and learning. It argues in particular 1) that ICT in its current form signals a paradigm shift in education—but this thesis is difficult either to prove or disprove; 2) that Deleuze and Guattari's *rhizome* provides us with a theoretical tool for understanding the pedagogical nature of this shift; 3) that this change is wider than literacy itself and announces posthuman elements in the socio-cultural environment of learning.

KEYWORDS:

Digital literacy, rhizome, social media, posthumanism

INTRODUCTION

Evidence suggests that more and more children in the western world have access to the internet and that this access is bringing about at least a literacy change if not wider changes. Somekh et al. found that 10–12-year-olds spent 3 times as much time on their computers as they do at school while by age 16, this proportion had risen to 4 times (Somekh and Mavers 2003, p.413). Belgian figures note that 91.2% of primary school children surf the internet at home while there has been an increase in internet use of 342.2% from 2000 to 2011 (Valcke et al., 2011). A study of Korean schoolchildren from 2007 also indicates internet use by school-goers at 92.8% (Sook-Jung and Young-Gil, 2007). Other studies in Australia confirm this trend (see Zevenbergen and Logan, 2008) where the figure of one region in Australia was given as 87.31% while Ireland at 92% (see *Ipsos Mori*, 2008) together with studies on social networking of Spanish youth (Colas, Gonzales, and De Pablos, 2013) confirm this general view that at least in western Europe computers have become part of a new literacy affecting children as young as 5 or 6.

1. A PARADIGM SHIFT?

It is generally accepted that children are now 'digital natives' (Prensky, 2001) and that this digital character has become central to childrens' learning today. The impact of this state of affairs on the authority of parents, teachers, authorities, institutions of learning, and disciplinary leaders, such as professors, has yet to become clear. The web has risen up like a massive root system with its entanglements and contortions, links and hyperlinks, facilitating a new form of intimacy between learners and their sources. In the mind of its optimistic

advocates, Information and Communication Technologies (ICT) offer the hope of abolishing poverty, fear, fragility, emptiness and isolation at the touch of a button. Recent political upheavals across North Africa are testimony to this new-found optimism and the belief that world-wide communication and generalised global support can bring about democracy and freedom. This mood is infectious. They contribute to the belief in a common global world with common global values and a safe environment where hand-held devices operate like magic wands drawing people into a zone of security where everyone is apparently connected and 'friendly'. So what if there are occasional problems with personal safety and identity theft on the internet (See Valcke et al., 2011)? These negative side-effects are inevitable but minor, so the optimists say. Fortunately, access to a vast quantity of information signals new possibilities and the emergence of a new kind of learning, so why should we worry about some minor safety issues?

Optimists−Blake and Standish strongly label them 'conservative' (Blake and Standish, 2000, p.6) − suggest that these technologies merely offer a new set of learning tools. They say that technology can still provide a take-it-or-leave-it resource located at one step removed from and still capable of 'representing' the content of knowledge. They claim that the rhetorical form of the media can be overcome by careful reflective deconstruction. Hence ICT are a welcome support for any teacher's attempt to put a shape on knowledge for learners. They offer marvellous, high impact resources that were never there before. They stand a good chance of improving creativity and concentration and they link the child's web-based activities at school with what they do at home. Accordingly optimists prefer to think that 'there is nothing essential about a computer environment (or indeed any cultural tool) (Sutherland et al., 2000, p.198) and that with proper method these resources simply add to the productivity of users. They say that immersing children should be embraced positively even if 'we remain uncertain about how we can systematically observe the new practices associated with computer use' (Nixon, 2003, p.410) because 'meaning-making' and the constructive paradigm both still prevail in classrooms. Indeed on this reading the goal of current educational thinking on digital literacies should be to 'establish a common language and some shared understanding about new media and online literacies and how these might be researched' (Nixon, 2003, p.411). This is the happy picture.

Meanwhile, while this environment is developing at full speed, educators still orient themselves to the more traditional human purpose of education by putting or attempting to put a shape on information for the benefit of learners. Educators continue to imagine themselves as mediators of knowledge, acting as the interface between the young people they teach and the vast quantity of information available. Mediators can be less optimistic about ICT because they are less certain that the character building process uppermost in an educator's mind is possible in the context of multiple influences. They feel that they are waging a losing battle in view of the 'obscenity' of information available (Baudrillard, 1983/1990) and the inability of students or indeed teachers to digest and reflect on the information available.

Others propose that these changes represent 'a more fundamental transformation in learning infrastructure' (Livingstone, 2012, p.20). They are not so positive about what they see as a paradigmatic change. They say that a paradigmatic change on a par with the invention of the printing press is occurring. Papert, for instance, has called what is happening a 'megachange' (Papert, 1994), one that has brought in its wake a new orientation towards education itself. Indeed, once the sociocultural implications of learning are accepted,

‘concepts like knowledge, teaching, the disciplines and rationality’ have become destabilised’ (Somekh and Mavers, 2003, p.412). The work of Marshall Mc Luhan in the 1960s, especially his famous contention that ‘the medium is the message’ (Mc Luhan, 1987/1964), has now become quite relevant and can be taken to imply that the rhetorical impact of the new media has effectively re-defined the scope and nature of information itself. Lankshear et al. propose that ‘the digital age is throwing many of our educational practices and emphases and their underlying epistemological assumption, beliefs, concepts and substantive theories into doubt’ (2000, p. 39). They draw heavily on Lyotard’s critique in *The Postmodern Condition*, which I heavily interpret as follows:

- WWW is increasingly using ‘established’ knowledge (hence conservative)
- didactic energies of teachers are directed at managing media resources (hence diluting the mediating function of teachers)
- the knowledge presented is evaluated in terms of its ‘use’ not its ‘truth’
- ‘Performativity’ is linked to (and often measured by) ICT competence (how well they manage with the medium)
- Connectivity becomes the benchmark for high performance (how well connected are you?) [as interpreted, pp. 24−25]

Any of these factors would give rise to pedagogical concerns and further debate but I am proposing to adopt a single line of direction, deriving principally from Deleuze. It still remains to be seen just how radical this shift has been in recent years and whether it is indeed a positive or a negative thing. In the next section I wish to highlight two contrasting concepts that have become important to the analysis of this problem.

2. TWO UNDERLYING CONCEPTS: THE TREE AND THE RHIZOME

2.1 THE TREE

It is perhaps best to return to a figure that is already quite familiar to most educators. *Arborescent* root systems present knowledge as a tree-like feature with roots stabilised in the ground, out of which grow a trunk and branches. It is a common enough metaphor to speak of a ‘root and branch’ study or a ‘root and branch’ clean-up and one hears of ideas ‘stemming from’ other ideas and various ‘branches’ of learning. From this metaphor comes the idea of basic, intermediate and advanced command of a discipline and a *linear* progression through knowledge. This arborescent knowledge has a starting point and the way it builds into a predictable, almost pre-formed (*a priori*) shape means that it constructs of its own accord well-grounded fields of knowledge that are stable and bordered and can be policed ultimately by experts. Teaching in these circumstances is conceived of as a manifestation of disciplinary authority, which implies a natural hierarchy, however it is managed, where the expert gives and the non-expert receives, where the expert grades and the non-expert is graded, where the expert decides what is to be learned and the non-expert simply complies with this authority. Knowledge understood in this way is linear and stable and it is divided up into areas where roots can be established and on top of these roots, a steady trunk of content with the eventual promise of expertise. There is a steadiness about this kind of knowledge which can withstand the storms of change and continually retain its core structure despite shedding some of its peripheral elements.

This arborescent type of structure establishes the starting point of a field of knowledge and grades the material so that it becomes progressively more developed and complex. Eventually it creates expertise and establishes institutions of knowledge, one of which is a 'discipline' that both shapes the knowledge and the learner – this interior quality of true knowledge being a basic Socratic requirement of educational knowledge. But here this Socratic move comes up against Foucault's complaint about power/ knowledge, namely, that knowledge is arranged into discrete packages as a result of power interests more so than on the basis of any inner coherency, thus implying that the agreement to follow disciplinary knowledge is also the agreement to become complicit in its priorities and hence 'subject' to it. With even more sinister consequences, other underlying 'abstractions' like Unity, Totality, Reason, Subject, Origin, Tradition run the danger of operating as oppressive 'apparatuses' drawing knowers into the 'subject' position demanded by knowledge organised under these rubrics. Of course Foucault will attempt to wage war against these apparatuses and the general subjectification they imply (Gordon, 1980, pp. 83−86). However the effect of Foucault's criticism is to increase rather than decrease any social disenchantment with traditional learning.[1] Nor can the constructivist paradigm which lays so much emphasis on 'meaning making' and 'narrativity' escape Foucault's basic critique. 'Subjectivity' carries with it the ambiguity of being complicit in a wider context. Perhaps a new type of structure might enable the freedom that is much sought after by educators?

2.2 THE RHIZOME

A *rhizome*, on the other hand, is another kind of root system and it promises freedom. It is a relatively new metaphor in the context of educational studies. It has been used in the philosophical literature from around the year 2000 but its origins lie in Deleuze and Guattari's definition as a taproot which has 'a multiple, lateral, and circular system boasting all the tactile associations that this connectivity brings' (Deleuze and Guattari 1987, p. 5). This botanical term, which refers to a tuber root system, has now come to serve as a metaphor both for the World Wide Web (WWW) and also for the way the human brain operates where trillions of synaptic contacts are thought to operate and as yet have not yet been mapped or even properly understood. One could see the relevance of 'rhizome' as a metaphor for the way the human brain makes connections within its synaptic pathways. It may represent how signals are diverted onto other pathways if a minor area of the brain is damaged to compensate for the original one. Most commentators agree that the information on the web is presented to the surfer in a non-linear manner (Holmes and Gastaldo, 2004) although Drummond objects to the term 'chaotic' to describe it (Drummond, 2005). Few however would object to calling this presentation of information 'radical' in the sense that it points to some root change in the context of information storage.

If we compare the complexity of these rhizomatic systems with a tree which has a linear – root, trunk, branch- shape, we can see that human knowledge has been organised in

[1] 'What it really does is to entertain the claims to attention of local, discontinuous, disqualified, illegitimate knowledges against the claims of a unitary body of theory which would filter, hierarchise and order them in the name of some true knowledge and some arbitrary idea of what constitutes a science and its objects. Genealogies are therefore not positivistic returns to a more careful or exact form of science. They are precisely anti-sciences' (*Michel Foucault, Power/ Knowledge*, p. 83).

traditional education to follow the arborescent model. Cut the roots of a tree and it dies. Cut the roots of a rhizome, on the other hand, and it *diverts*, drawing its moisture from other channels moving in other directions. The channels now accidentally become more important because of the diversion. Similarly, cut the roots of a discipline or abandon its foundations and it dies, whereas cutting out a site on the WWW simply blocks out one site while re-energizing other sites, other perspectives, often making them appear as momentarily more important. The topography of this information presents itself as infinite and total, a resource that never dies but rearranges itself instead around the missing element. The immortality of the system is shown in the way information presents itself as a non-disciplinary species without fixed shape or preferred identity or medium like a minestroni soup which because it moves in many directions at once can repair itself easily without signalling any weakness in underlying structure.

The rhizome suggests a form of curriculum that is not centred or built up by local authorities but rather fragmented and perhaps initially confusing but which is hopefully more democratic, more open to all available information (Deleuze and Guattari, 1987, p.139). As the information is not arranged in the form of a rational argument or a consistent narrative or indeed as having a particular line of direction, does this mean liberation? Perhaps Deleuze and Guattari might say so:

> We're tired of trees. We should stop believing in trees, roots, and radicles. They've made us suffer too much. All of arborescent culture is founded on them, from biology to linguistics. Nothing is beautiful or loving or political aside from underground stems and aerial roots, adventitious growths and rhizomes (p. 14).

Supporters of the rhizomatic metaphor note the similarity between it and the Enlightenment project, arguing, as Deleuze does, that the rhizome offers a new opportunity for freedom from oppression (see Morss, 2000). On the basis of pure logic, there is no way of predicting what item of information comes next in a web search and there are difficulties when surfers try to retrace their steps due to inevitable distractions and deflections along the way. This 'deterritorialisation' might indicate that we are finally freed from our serfdom to power interests, yet Deleuze and Guattari prefer this outcome to the inherent limitations imposed by arborescent thinking.

So on this reading the rhizome is a liberating force, challenging established hierarchies while enabling escape from conventions and vested interests. This in itself could have a positive educational effect as it prolongs the anonymity cherished by children, enabling them to experiment with their identities, to play at being adult, to take forward steps which are immediately reversible. Wilson, for instance, analysed the *manga/dojinshi* phenomenon in comic book art, which has in recent years spread from Japan to Taiwan, Hong Kong, Korea and the Chinese mainland and the United States and used this art form to encourage students to generate drawings to put on the web (Wilson, 2003). For them the medium was so attractive that they enthusiastically set about developing appropriate art skills. This art form involves the insertion of micro-stories into an overall unending comic book story where 'the disappearance of one part is of no particular consequence because it will be replaced or supplemented by other parts' (2003, p. 222). All individual inputs were eminently substitutable as players uploaded their own prints/ pictures to this virtual world in response to the broad guidelines suggested for the characters. Their contributions for a moment could have become central to the never-ending action but also eminently deletable. While students could achieve instant acclaim by having their images published as part of the totality amidst their peers, they did not have to bear any responsibility for carrying the story forward and

could withdraw at any moment without recrimination. They could also be jettisoned. They were in a sense both reader and writer at the same time, while also being expendable as either, having achieved a status of being that is both hyperreal and empty. Their story lines operated like rhizomes, which can tolerate being broken off from the totality because the story can immediately find a new 'line of flight' and another direction (Wilson 2003, p.23). In conclusion, engagement in online activity might be liberating because one can make a mistake without this mattering too much, provided one does not need the recognition for having tried to achieve something.

Because it is less subject to the dominant shapes of traditional knowledge, web knowledge generates an expectation that this new state of affairs is capable of delivering 'a non-authoritative pedagogy and organization of knowledge' (Gregoriou, p.242) and this is initially thought to be a good thing because it 'frees' learners to be constantly in touch with different information. Their perspectives are broadened by the fact that there is no particular expectation that the knowledge emerging at any given time will be disciplined, fixed or requiring 'subjectification'. Moreover expertise in a traditional sense has been abandoned in favour of the knowledge that is high impact and singular. Where traditional knowledge seems boring by comparison and too neatly packaged, rhizomatic knowledge benefits from many accounts and interpretations. One has to wonder whether this journey is a liberation, however, and whether the lack of an authoritative voice is a liberation. This question is leading us to identify some of the pedagogical effects of the rhizomatic turn.

3. **PEDAGOGICAL EFFECTS**

Let us return once again to the definition of a rhizome as a taproot which is 'a multiple, lateral, and circular system boasting all the tactile associations that this connectivity brings' (Deleuze and Guattari, 1987, p.5). The rhizome does not grow in a particular direction like a tree. Learners find it difficult to establish a set of coherent outcomes from a web search unless they plot these outcomes in advance. Since information acquisition by means of web searches does not follow a straight line, it is hard to imagine an end point or any point that might be considered an end point against which to be plot the circular figure of knowledge. Let us suggest some possible pedagogical consequences of this knowledge environment, confining our attention to epistemological aspects and leaving aside two equally important aspects, namely the social and the moral.

3.1 EPISTEMOLOGICAL FEATURES

The first epistemological feature is the claim of any piece of information to fit into a larger set. One feature of rhizomatic knowledge is that it has become *bite-sized* and thus not so easily fitted into a larger set. Because of the scale, volume and speed of the information that hits the average surfer on the internet, there is no ambition to digest all that is available and those who are inexperienced have less and less chance to build up experience based on what is encountered. A second feature is that knowledge to be noticed must have high impact or it is instantly dismissed and so *impact* becomes the operation of a singularity much like a light switch that turns on and off without any need to establish context or history. There is a trend against integrating the information received by means of a subjective strategy, for instance, by composing a story or submitting to an objective self-standing system like a discipline. There is a resistance to linking knowing to a totality or forming one's experience within a discipline or code. The focus seems to be more readily applied to the part rather than the

whole. Livingstone reported a case arising from *UK Children Go Online* of a 10-year-old who had to navigate a ship around the coast of Scotland in a computer-generated game. The child needed to enter the direction and the distance to be covered. The child failed repeatedly crashed the programme, never read the instructions because she was too busy on task and, as a result, did not step out of the game to consult a compass as advised in the instructions. Instead she crashed out of the game repeatedly without learning what she had done wrong (Livingstone, 2009). Livingstone also notes another case mentioned in Willett (2005, as referenced in Livingstone, 2012, p.18) of a group of ten children (9−13) involved in a Saturday morning club who had difficulty in performing a task that demanded sequenced steps. One of these, Angie, aged 9, had this to say 'They let you go on the internet but it has to be educational stuff you look up and all that. That's boring but we don't listen to that and we look up what we want when the teacher's not looking'.

These examples simply illustrate the point that web information is not received with the disciplinary shape that one might expect. Indeed surfers have found a way to avoid the graft of learning by losing themselves in the *bite-sized* and high impact character of internet knowledge. One might conclude that learning is only allowed to impact on the surface of a learner's life. The surfer's attention is drawn here and there while the information is checked against its difficulty and difficulties are avoided. This means that units of knowledge are not allowed to shape a person's character in the sense of *Bildung* but instead blend in with surfers' actual states of mind and knowledge, moving them away from difficulty, incomprehension, challenge by offering switches to other available media – video rather than chart, article rather than video, presentation with higher number of hits versus one with lower number of hits etc. Information is closer to play than to work. In this context, the latest offer from a holiday company or a social club can easily distract surfers and bring them off focus. Gibbons has suggested that there has been a switch from a disciplinary system to one marked by a system of socially distributed knowledge while Le Grange also mentions how the learning achieved must be 'applied, problem-centred, transdisciplinary, heterogeneous, hybrid, demand-driven, entrepreneurial, network-embedded and so on' (Le Grange, 2011, p.750). It might be added that without disciplinary controls digital information relates primarily to other digital information rather than to integrated wholes and so the law of contradiction which is the normal guarantee of rationality itself, is not applied to a web search. Instead each piece of information is designed to stand alone and not as part of a system. Important information is characterized by the way it offers 'instant feedback' (Zevenbergen and Logan, 2008, p.38) and it is feedback that characterises the third epistemological feature of internet learning.

In summary, the three key pedagogical features from an epistemological perspective can be listed as the *bite-sized* character of web-knowledge, the way it retains its relevance by means of its *impact*, and the character of the *feedback* loop it engenders and even demands. Those of us working in education recognize these are generalized features of the new learner who easily reorganizes knowledge in interesting but non-traditional ways, expects to be distracted as learning occurs and is conditioned to offer and require feedback, often on a 'I like/ I don't like basis. There are in addition some additional effects for teachers that follow from these features.

3.2 OTHER EFFECTS

The first of these effects for teaching is the fact that knowledge now needs to present itself as entertaining and pleasurable. The hard-graft is gone and the result is a decrease in the appetite

for sustained attention to any disciplinary task. While surfing on the screen, there are pop-ups and advertisements that happen to distract and to draw the inquirer in many directions at once, and so there is a sense of dissipation through converging emails, text messages and chat-rooms designed to beep or flash when visited. Surf-Knowledge distracts by its very nature and the search for it, as David Buckingham suggests has become 'increasingly distinguished by a kind of pleasurable anarchy and sensuality' (2007, p.81).

A second effect for teaching is that knowledge presents itself as hyper-critical. Inquiry disowns any sedentary basis for its procedures. Indeed Deleuze and Guattari dismiss the sedentary point of view (2007, p.23) and promote instead 'a nomadic subjectivity that allows thought to move across conventional categories that disturb 'settled' concepts, signs, and theories' (as referenced Gough, 2004, p.282). One needs to ask about the effect of this cognitive nomadism on the young for it is one thing to promote a critical form of knowledge aimed at those who know the traditions already, those who have a sense of stability in their own personas and in their social surroundings; it is another thing to propose this same critical attitude to those (usually children) who do not as yet have a firm grasp of the conventions of their own societies. This is an issue that is as old as Socrates. Some argue that it is dangerous for children and young people unsure of themselves to engage exclusively in the instabilities signaled by rhizomatic inquiry. Others retort: what instability? There is no evidence that knowledge is stable, other than the power conventions that present it as such. Following this line of objection, those who think of internet knowledge as hypercritical imagine that no further critique is needed and so they effectively agree with the conservative mindset that wants to hold fluctuations solely on the surface.

A third effect for teaching is that rhizomatic knowledge is difficult to remember. It presents almost an instant antidote to rote learning because rhizomatic knowledge is presented as a layered phenomenon, each layer valid on its own level because it is live on the internet and relevant because it happened to crop up as part of a search. Nevertheless sites and presentation media are not linked to one another in any logical fashion unlike grammar rules. The information is thus 'briefly' validated by the operator by means of a 'click' on the site which creates the key syntax of what is relevant knowledge and what is not. Because surfing involves hopping and switching, swiping, clicking (mouse), clunking (keyboard), mixing interpersonal issues with technical matters and cognitive, the result is that these vibrant but unpredictable links do not operate like a mnemonic might or a repetition principle in the Aristotelian form *Repetitio est mater studiorum* (Repetition is the mother of learning). Social links are implicated but the line of direction, the logical links, the logic of the line of questioning, the research journey in itself is irrelevant to the results issuing from the research. The result is what counts not the line of direction that gets you there. So apart from the invisibility of machine logic, since machine-coding methods remain hidden (Standish, 2000, p.158), many individual searches do not involve any commitment to the *line of inquiry* undertaken but only to *the result* obtained. The learner somehow floats over or under the highlighted information.

A fourth effect for teaching is the way web information downplays its historical character. All information must be relevant and available on currently maintained platforms. It is as if each bit of information needs to claim its position on a timeline that is uncompromisingly present in order to be valid. Cultures that have been undermined for other reasons and are 'hollowing out', losing their own self-confidence and self-belief, are particularly vulnerable to this requirement to be contemporary. One can think of many areas of the world which have lost touch with their own survival traditions under the pressure of being contemporary.

A fifth effect for teaching is the fact that knowledge is sometimes contrived to be artificially limited. Sometimes as an antidote to the infinity of information on the web, knowledge is presented as easily accessible and this strategy is very attractive to teachers. This happens when knowledge is shaped on the web using a 'games' strategy with borders and levels which children and adults find attractive. The feeling of being able to move beyond levels is sometimes addictive. Various devices are used to give the impression of 'breaking through' fixed borders as the learner progresses through a series of set tasks. In this way there is a tendency for distributors of rhizomatic knowledge to mimic the logic of internet games, enabling 'drill and skill' activities that induce repetitive behaviors and a fixed number of skills. The internet makes possible Robinson Crusoe-type building projects such as the ever popular *Minecraft* ™, which also play on the idea of finite/ infinite. There is no denying that repetition and looping are an attractive feature of these games and that as such they can reinforce skills (soft skills) but they have a paradoxical benefit because they also develop task-focused, compulsive behaviours that seem to inhibit actual socially cooperative learning patterns. A more creative possibility is some vivid exploration task using a programme like *GoogleEarth* or GPS software as these kinds of activities are open ended and may well mimic real exploration but these may ironically be too 'live' for teaching purposes.

4 IDENTITY

Just as significant are the effects on human identity. Under 'rhizomatic' conditions knowledge has become dystopian, meaning that rhizomatic knowledge does not claim to unify the psyche but simply invites the psyche to present itself through different *avatars*. In the past, it was thought ideal to have one identity, now it is considered better to have multiple identities. This is the schizophrenia of contemporary culture. In the past, undergoing a programme of study was thought to develop the learner in certain ways – the study of engineering would produce engineers or the study of history historians or the study of pedagogy teachers etc. while a general education would produce an educated person. And while this is still in relation to traditional programmes, there is a real problem for people trying to adapt to the different contact possibilities available on the WWW in this way. Pessimists might say that where there is a trend to centre the curriculum on the internet itself or at least use the internet platform as the mediating device for programmes, a corresponding identity is formed that matches the internet – absolute, unhistorical and non-committal and this means a move away from traditional utopian visions of identity. Marshall has even suggested that dystopian knowledge has changed the way knowledge relates to the educational project moving education away from liberal humanist ideals (Marshall, 2008, p.12). There is no indication where it might be moving towards. Lankshear et al. note that where formerly knowledge was 'until recently regarded as a universal welfare right under a social democratic model', now in accordance with what I am calling its *bite-sized* profile, it has 'been reconstituted in instrumental and commodified terms as a leading contributor and sub-sector of the economy' (p.23).

One can see the problem for human experience, which to follow Aristotle, is in itself united around the historical time-flow of ordinary experience (*Metaphysics* 1,1). In order to teach, humans need to be able to present learners with human knowledge, that is, biometric information that has been understood and shaped in a human way and integrated into a historical reality. Today we have moved away from Aristotelian thinking, meaning that attention has shifted away from the historical way human beings learn, building up notions

into hard and fast ideas, as Aristotle might say, and testing these ideas experimentally until they become central features of human experience. For information to be valid today, it must be renewed and justify itself as new. It is no use saying that in a rhizomatic environment we stand on the shoulders of our own ancestral selves, for these ancestral ghosts have no validity in a context of multiple identities. Nor is the internet solely about content but about opening up relations and keeping them open (Weston, 1994 as referenced in Lankshear et al. 2000, p.20). Hence the use of knowledge to unify the psyche is bound to be less effective and the call for a multiplicity of selves or psyches is beginning to drown out calls for a unity of psyche.

Similarly the issue here is whether the rhizomatic turn is progressive also turns on these same educational effects. When John Dewey attempted to establish the progressive credentials of knowledge, his method focussed on experience and his philosophy followed the Aristotelian tradition of well-being. He considered three factors: subject knowledge, rules and regulations; and school organisation (Dewey, 1988, p.28). He set each of these suggestions against the backdrop of his democratic ideal since he argued first and foremost that 'the progressive movement is … more in accord with the democratic ideal to which our people are committed than do the procedures of the traditional school' (p.33). Dewey assumed that the democratic and the humane go hand in hand, the combination of which lead learners in the direction of a continuation of experience by which Dewey means a form of life that connects the past and the future, calling this a principle of 'universal application'(p.35). In the same passage he experiments with the concept of growth, pointing to the need for direction so that growth promotes a consistently positive set of ends. The violin player practices in order to become better and more assured at playing the violin. All practical skills demonstrate the same features – they do the learner some good. What is learned is required to clarify and heighten the learner's living experience and on the common social practices that are built into living experience (p.39). The metaphor is one of growth, continuity of experience, external social conditions impacting on growth, an 'interaction' between internal dispositions and external helps, a general 'situation' in which the continuity of experience expresses its interactive quality (p.44). A good progressive educator then blends these conditions of learning in a sensitive manner while a traditional educator may make the mistake of relying almost exclusively on the external conditions he/ she or the school can provide. As a result the traditionalist comes to oblige learners to live off a 'diet of pre-digested materials' (p.46).

Although Dewey never could imagine the range and scale of the world-wide web, he would still note certain similarities between the 'traditional' approach and the situation confronting the rhizomatic learner. The absence of a teacher as the important mediator judging which information to present or facilitate at a time that suits the students amounts to a release from traditional limitations. The new environment of web inquiry is likely to be 'stimulating' rather than 'boring' and the subject-matter encountered is likely to be effervescent. But will it be fulfilling in the old sense? In other words will people experience the satisfaction of learning? Rhizomatic inquiry could be seen as avoiding the flaws of traditional transmission because the digital activity is or seems to be free, anarchic, uncontrollable, indeed 'nomadic'. However, if this surfing activity brings about no lasting effect and if all is being carefully watched, monitored and tagged to advertisements and various economic controls, then it is difficult to see this as a sign of liberation or progressivism. Nor is it easy to describe internet learning as a form of continuous experience because 'experiences may be so disconnected from one another that, while each is agreeable or even exciting in itself, they are not linked cumulatively to one another' (Dewey, 1988,

p.26). Similarly spending hours ‘being-in-touch’ (Long, 2013, p.80) does not usually mean being in a community of learners with other learners. It often means being isolated and linked to others who present themselves as already experts in some way or blog owners who prefer to present their interpretations as knowledge. The surfer then is induced into quiescence despite the stimulation. The induced passivity of minds and bodies might be another pointer towards inactive learning, quite contrary to the general impression of being busy and fully engaged.

And as for school organization, rhizomatic inquiry could demand some changes to the structure of lessons and the way learning is achieved in schools. School timetables might have to include free time for research as students spend increasing proportions of their time working in groups researching material for projects. Orthodox centres of learning like schools and universities are not adapting to these demands as yet because most of them are defending the disciplinary (arborescent) structure of knowledge. But the scene is changing.

All things considered, the rhizomatic turn signals a more fundamental change for educators than the simple addition of a new resource. While humans in the past have survived because they valued knowledge as an *arborescent* figure, this is because they valued human reason as the central organising element governing both knowledge and identity. Reflection on this depth structure extends back as far as the *logos* of Heraclitus and the many studies of the depth structures of human rationality, suggesting with these rational figures that people could be educated into some common human culture. It seems that the postmodern subject is no longer happy to dedicate itself to a quasi-Hegelian task of unifying and raising up matter to ever higher levels of rational expression. Instead it must make do and indeed act on the basis of remainders, deferments, deflections, confusions, half-baked ideas. A rhizomatic being must engage in a continuous readjustment to new data, which only the effective use of machines can hope to manage. Perhaps this is the reason why postmodern identities are so clearly linked to their machine connections.

Calleja and Schwager (2004, p.5) may be right in holding that the term ‘human’ is becoming problematic. Hayles sees this problematic in the shift from a dialectic of presence/absence to a dialectic of randomness (as referenced, p.6) and this randomness has been given added shape by Ulmer who notes that there has been a switch ‘between alphabetic and electronic cognitive styles’ (as quoted, p.8). Since machines are masters of random links, and as humans increasingly depend on machines, then a different relation to time begins to govern human lives. A logic of happenstance ultimately develops and with it a new logic of change. The issue of hypertext almost exactly duplicates the physiological switching manoeuvres of young learners as they swipe and click between levels of information selected by means of association rather than by indexing (p.10). Perhaps Calleja and Schwager are right to be optimistic because ‘[h]umanity has survived the hostile environment it found itself in through the use and creation of tools and the development of technology that enables their creation.’ (p.12). Perhaps optimists are right to point to the way the rhizomatic phenomenon facilitates a new form of intimacy that, in the mind of its advocates, suggests that it is capable of abolishing poverty, fear, fragility, emptiness and isolation at the touch of a button. I am rather less optimistic. In my view, educators need to find the ‘human’ again in the midst of this paradigmatic shift and this work has not really begun.

Indeed we still don’t know whether the new environment is sufficiently dominant to replace traditional modes of knowledge acquisition helped by schools and teachers. Life in machine-time is characterised as much by random development as by forward planning. It suggests that having once invested our being in historical experience, we may now be investing in a particular kind of

forgetfulness of history. Indeed the speed of technological development is so great that we seem to have been thrust into a post-human environment with no time to wait. Rather than evolving eventually and after millennia into super-brains with super-bodies, we are impatient and want to bring this change about now in the immediate future. So the immediate trend is toward the bionic enhancement of the human body, the systematic invention and production of machine elements to replace non-optimal body parts, the preference for machines to replace human work tasks (often at the expense of human jobs), X-men and superheroes and a fascination with immortality and for the moment surface add-ons designed to enhance performance and improve health and pleasure. Can human knowledge survive at this speed or has the 'human' become the figure of an outmoded form of education?

CONCLUSION

This paper has limited its focus to three headings to illustrate the radical nature of current changes: the impact of the rhizome on the nature of knowledge, on the 'human' response to information normally handled by the term 'pedagogy' and on assumptions made about the humanistic foundations of education and finally on some effects of these issues on 'human' identity. As humans learn to become more mechanical and machine-like in their behaviours as a result of the rhizomatic turn, they enter into what Noel Gough has called a 'posthuman' phase (Gough, 2004) where the virtues of mechanical reliability, coping with randomness and ultimate impersonalism prevail over the traditional values of temperance and courage. A fuller discussion of this matter remains beyond the scope of this paper but the question adds a certain urgency to the current trials of the rhizomatic learner. For the present, our objective has been to comment upon some implications of this 'new' kind of knowledge for teaching and learning.

NOTE

[1]'What it really does is to entertain the claims to attention of local, discontinuous, disqualified, illegitimate knowledges against the claims of a unitary body of theory which would filter, hierarchise and order them in the name of some true knowledge and some arbitrary idea of what constitutes a science and its objects. Genealogies are therefore not positivistic returns to a more careful or exact form of science. They are precisely anti-sciences' (Michel Foucault, *Power/ Knowledge*, p.83).

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