
Educational change, the agency of the educator and heterogeneous assemblages

Dirk Postma

Abstract

The article queries the possibility and nature of human agency in educational change by developing a position between the modernistic centred agent and the postmodern disappearance of the agent and by locating agency in heterogeneous assemblages. It investigates how the educator could fulfil his/her agential role to ensure worthwhile educational outcomes. It draws on theories of sociomateriality in its symmetrical investigation of human and nonhuman agency and the heterogeneity of practices. Since reality is continually being performed (and not just reproduced) through heterogeneous practices, educators have to be able to evaluate actual and emergent outcomes, imagine possible realities and contribute towards the performance of different realities. The presence of technologies in education is used as the entry point for these investigations. It is concluded that the agency of the educator is dependent on his/her strategic positioning within the fluidity and emergent nature of practices. Such strategies are informed by an awareness of agential spaces that may open up possibilities for alternative actions and judgements about valuable educational outcomes.

Introduction

Educators in South Africa (and elsewhere) find themselves increasingly within discursive spaces which apparently leave very little opportunity for exercising their agencies. These discursive frameworks are constituted by entities or agents such as policies, the presence (or absence) of resources, market-dominated demands, technologies of assessment, monitoring and surveillance techniques, syllabuses, timetables, work schedules, unions, parental demands and the autonomous learner imbued with rights. In so far as these frameworks are informed by the ideology of performativity they deny educators key elements of their agential role, namely the judgements and actions that should contribute towards the selection of appropriate educational content and the achievement of valuable educational outcomes. What contributes to the crisis of agency is that this agential role cannot be defined any more in a modernistic way in terms of a centred and dominant agent and a clearly articulated view of the nature of education. However diffused and

decentred the agency of the educator might be in the postmodern era, it should still be regarded as a necessary condition for the achievement of worthwhile educational purposes. This focus on the agency of the educator is not another centring strategy, but rather an attempt to understand how possibilities for agency are opened up.

In order to investigate the possibilities of an agential role of the educator, the powerful discursive context of technology in education is being used. We often hear the refrain that educational technology and in particular ICTs are 'deeply implicated' in changes (Conlon, 2000) but we have little sense of how this happens and what the possibilities and strategies of intervention are for educators, policymakers and students. The way educators find themselves in the discursive and material spaces of policy-talk and of technologies in the classroom and school seems to leave little room for their agential role. In these spaces the role and benefits of technologies are taken as given and educators are seen as relatively passive implementers. The implementation of new technologies is often accompanied by high expectations of how education will be improved or by a feeling of doom because of the loss of agency. We are, however, not quite clear about the ways technologies affect education and whether there are possibilities for the educator to assume an agential role.

An attempt to define the agential role of the educator has to manoeuvre between the centred modernistic and the absent postmodern agent. A strong and centred sense of agency is at the basis of modernistic approaches. Assumptions of the centred agency of the educator are behind programmes which are informed by the belief that, once properly trained, educators will effect the necessary changes and are to be blamed if the changes are not realised. Such assumptions are also behind conceptions of e-learning where the learner is taken to be in control, or behind policies which are expected to effect necessary changes. Huge investments in technology assume a strong sense of technological agency that is expected to bring about more equal, accessible, affordable and productive education. These attributions of strong agencies often lead to disappointment and despair since they invariably fail to perform in accordance with the expectations. In spite of such disappointments, the underlying belief remains that effective changes could only occur when a strong, centred agent with clear intentions and plans is present.

This article challenges any modern notion of a centred agent, whether human or nonhuman. It also challenges postmodern conceptions where the agent became so fragmented that it has disappeared.

While it is taken that the agency of the educator is essential to educational reform and that the active involvement of the educator is essential for meaningful change and worthwhile educational outcomes, the nature and possibilities of this agency have to be clarified. Such a clarification cannot focus on the agency of the educator in isolation from the practices within which s/he participates. These practices are conceptualised in a posthumanist way as consisting of both human and nonhuman agents. In such a sociomaterial perspective agency is not a property of a person or an entity, but a relational effect of heterogeneous assemblages. ‘Sociomateriality’ refers to a non-essentialistic view which does not make *a priori* assumptions about the nature of categories (social, material) or entities (such as humans or nature) before their constitution in practices is traced. By denying an essential identity of humans, it is possible to identify how agency emerges. The concept ‘heterogeneous assemblages’ refers to the bringing together of different kinds of entities (human or nonhuman) within a coherent practice in such a way that agency could not be located with either humans or nonhumans but where it should rather be understood as the outcome of the practice itself.

The article develops a conception of agency which locates it within sociomaterial practices; it discusses conceptions of technology within practices and relates this to notions of agency and performativity; the nature and possibilities of the agency of educators are lastly defined in relation to actual, emergent and imagined realities.

A sociomaterial conception of agency

A sociomaterial view of agency and of practices (as understood by MacIntyre, 1981) is developed in actor-network theory (ANT) (Callon, 1986; Latour, 1994; Law, 2004) and in the Studies of Science and Technology (SST) (Barad, 2003; Berg, 1998; Mol, 2002). These research traditions focus on the way any ‘assemblage’ come into being. ‘Assemblages’ refer to any kind of heterogeneous collection of entities such as any particular learning space, laboratory, friendship, computer, door, information system or practice. ‘Heterogeneity’ does not simply refer to the collection of different kinds of

well-defined entities such as humans, desks, rules, ideas, but rather to the ways in which these entities are constituted through the processes of assembly. Seen from a sociomaterial perspective, each of these assemblages consists of human and nonhuman entities that are aligned in a more or less coherent way and which have certain effects. One can think, for example, of the way in which a door as an assemblage anticipates an able-bodied person to push it open. In this context materiality refers to embeddedness of relations and values within material objects in such a way that others are affected (Sørensen, 2009). The social and the material cannot be separated in clear categories. Sociomateriality refers to the intermingling of material and immaterial (social) entities in such a way that clear boundaries cannot be drawn between the two.

Sociomaterial approaches provide methodological strategies through which the generation and maintenance of assemblages of agencies could be investigated. They focus on the processes of association and translation in order to see how agency and reality are performed. The tracing of the performance of reality is linked to the identification of agency. In order to identify agency, ANT uses the principle of symmetry according to which no *a priori* decision could be made about the kind of agent before the assemblage itself is being investigated. As far as the identification of agency goes, humans and nonhumans are treated symmetrically. Humans do not have a privileged claim to agency. Anybody(thing) could be an agent when it has an effect on others. This means that no distinction should be made between humans and nonhumans when agency is traced. This principle is necessary in order to identify and describe all possible agents without prejudice. Agency itself is therefore not defined with reference to humanistic beliefs about intention, autonomy or volition, but it is related to the existence of effects that could be traced empirically. If an entity (or assemblage) doesn't make a difference in the world, it is not an agent. Agency is not an individual property or initiative, but is produced by an assemblage which draws on the compliance of varied others. Strong agency could only be attributed to a single entity when the multiple and mostly silent others are ignored. An assemblage of various kinds of entities is therefore essential to produce the agency which is often allocated to an individual entity such as the educator, policy or technology. Agency is a relational effect (Law, 1994) of the assemblage. This is well-illustrated by Nespor (2009) who shows how the identity of a handicapped child is irreversibly changed from 'impairment' (an inner handicap) to 'disability' (a handicap that is overcome through devices) through the introduction of devices.

Agency could be found in both human and nonhuman forms. Practices are heterogeneous assemblages which should not simply be seen in a humanistic (Macintyrean) way as the product of typically and uniquely human associations, intentions and ideas. Heterogeneity does not simply refer to the presence of many nonhuman entities in practices, but to their active role. The very nature and purposes of practices cannot simply be traced to purely human origins because they are already materially mediated. If agency were only to be attributed to (intentional, rational, volitional) humans, we would only have a limited understanding of why and how stability or change occurs in practices.

This symmetrical notion of agency does not deny the ‘uniquely human’, but insists that such claims cannot be made without a careful tracing of all the other entities that contribute towards agency. Whatever may be regarded as uniquely human is mediated by an assemblage of other entities. This can also be applied to cognition (Star, 1995), volition, intentions and plans (Suchman, 2007).

The manifestation of the agency of the educator is usually related to the notions of competence and performance. These concepts are usually defined in relation to the knowledge and skills that educators acquire initially through their training but also subsequently through experience. If the notion of competence is seen instead in a sociomaterial way, it does not refer so much to the inner abilities of the educator, but to his/her association with various other entities. A competent practitioner is one who negotiates between different human and nonhuman agents in an attempt to effect preferred outcomes. Within sociomaterial assemblages, this has to do with the ability to enrol and mobilise entities such as a textbook, the timetable, the physical space in the classroom, the assessment standards, learners and parents. This agency itself is an effect of the network which we usually punctualise as the educator. The educator is never a sole agent, but is produced within a particular heterogeneous assemblage. Knowing when and how to associate other entities entails a respectful awareness of how these entities contribute towards shifting outcomes. In these processes the educator’s own intentions and plans change as well as the envisaged outcomes. The agency of the educator can therefore not be equated with the ability to effect his/her own envisaged changes or to achieve preset outcomes. It is more of a continual negotiation with various other agents in the attempt to achieve worthwhile learning within a particular context.

Technology within practices

The increase in numbers of technologies in education is used here to explore further the nature and possibilities of the agency of the educator. The views of the role of technology in human practices range from deterministic to instrumentalist versions. On the one hand it is stated that technology determines (or strongly influences) social changes, and on the other hand it is stated that technology is only a tool humans employ to achieve predefined purposes. In between these are social constructivist views according to which values and purposes are embedded or inscribed in technology and transferred in its employment.

One could agree with Heidegger (1977) that technology brings many dangers. But in contrast to this view, the conception of agency developed above prevents us from attributing any substantive role to technology. The benefits and dangers of the emerging realities cannot be predicted and the effects of technology cannot be defined in an *a priori* manner. No technology is simply and necessarily emancipatory or oppressive. It all depends on the realities that emerge through the practices. These emergent realities are not simply the effect of the way technology is designed, but should be traced to the complex interactions of heterogeneous agents.

A combination of instrumentalist, constructivist, substantive and deterministic views of technology appears in Selwyn's (2007) critical perspective on educational technology. He claims that educational technology is mainly developed outside education and serves particular political and economic interests associated with the capitalist economy and the information society. By imposing these technologies educational institutions become "little more than the knowledge factories and diploma mills of the new information economy" (p. 38). He claims that m-learning (mobile learning) "looks set to intensify the wider (mis)shaping of educational technology by noneducational sources" (p.41). In his view educational technology is used by political and economic forces for predefined ends (instrumentalism), economic and political motives are embedded in technology (social constructivism) and the implementation of the technology determines the ends (determinism). The substantive conception of technology comes to the fore when it is claimed that the employment of technology necessarily leads the development of particular dispositions in learners, or when it is claimed that the 'educational potential' (p.40) of technology is being realised. This potential is seen as an inherent feature of technology which has simply to be brought out by humans.

According to a non-deterministic and non-substantivistic view of technology developed here the view of Selwyn that technology is inevitable and that any kind of technology would always have particular effects within a certain practice, would be unsound. Although technology is socially constructed and may contain the values and dispositions of the market, it does not function in such a deterministic way in education.

In a more optimistic, but still deterministic mode, the White Paper on e-learning is a typical representation of the view that technology will ensure valuable educational outcomes for the information society.

The expansion of ICT is driving significant changes in many aspects of human endeavour throughout the world. At both micro and national levels, ICT has increased the effectiveness and reach of development interventions, enhanced good governance and lowered the cost of delivering basic social services (Department of Education, 2003, 1.3).

None of these views are helpful for understanding our entanglement with technologies, the emergence of agency, and the dynamic nature of reality.

One could agree with Selwyn that educational technologies should be in the hands of educators and that the educational agenda should not be determined by 'noneducational' sources. One could agree that uneducational assumptions are behind the rhetoric of m-learning when it is expected to enhance the agency of the learner and to remove the restrictions of educational institutions (Selwyn, 2007). But in order to become more responsible, educators need a better understanding of the human/technology entanglement. This understanding should move beyond a conception where technological developments are taken to have a logic of their own or where it is seen as simply a human construction within human control. In a sense it is true to say that we do not know where technology will take us. New worlds are continuously being opened up through our technological designs and new developments trigger further possibilities. This independent logic of technology is, however, only apparent since it is always part of some or other 'mangle of practice' (Pickering, 1993). With this notion Pickering indicates how humans and technologies are entangled in practices to such an extent that a clear distinction between the two kinds of agencies cannot always be made. Technology or technological development never happens in isolation from practices within which they are always embedded.

Issues of technology in education are usually associated with the introduction of particular media such as radio and television and, recently, computers and the internet. Concerns are often raised and expectations created about the role of every new technology. What is not adequately realised, however, is that technologies and other material entities have always contributed in significant ways to the shaping of human nature in general and educational practices in particular. The problem is that these concerns and expectations are focused in a limited way on new technologies and that the ubiquitous presence of technologies in all aspects of human life is not fully recognised. It is not fully recognised how education came into being through the historical and evolutionary entanglement of the human and the technological. It is a remnant of humanism to think that these practices are shaped by unembodied and immaterial human intentions and ideas without the mediation of nonhuman entities. One could only think of the introduction of writing devices which Socrates, according to Plato, objected to as it would destroy memory (Plato, n.d.). A more balanced perspective on new technologies has to recognise how the practice of education is already mediated by technologies such as the classroom, textbooks or student records that have become an invisible and 'natural' part of educational practices. The mediating role of these devices has significant effects on the nature and purposes of the practice.

The conception of agency developed above suggests that the nature and purposes of education are already necessarily and fundamentally co-shaped by a multitude of technologies and other materialities. Sørensen (2009) describes how desks, a door and the blackboard contribute actively to the shaping of educational spaces and therefore also to the nature, purposes and outcomes of education in a particular context. Sørensen's study shows how different sociomaterial learning/teaching assemblages effect the identities of and relations between teachers and learners, the nature of knowledge that is made available to learners, or the society of which learners become a part.

The materiality of educational practices refers to the way these practices are already entangled with a variety of material (technological) devices and artefacts. The materiality of practices together with the embodied nature of knowledge contributes importantly to the obduracy of these practices and knowledges and to the subsequent difficulty of changing them. Practices are not simply the product of human plans and intentions (Suchman, 2007), but are inscribed in the materialities and technologies. Conceptions of change or of learning that mainly appeal to cognitive forms of knowing are therefore

extremely limited. This humanist approach revenges itself in so many failed plans and policies that do not take the sociomateriality of practices into account. It is more useful to see the practice of education as an assemblage of heterogeneous entities. Human practices such as education (or science, medicine, governance) are not constituted through human actions alone, but also through the active role of other agents such as apparatuses, policies, handbooks and technologies. Although human intentions, plans and purposes are central to the development of practices, the outcomes are often unexpected and new. Although technology is always designed with particular purposes, values and worlds in mind and although these are inscribed and embedded in them, it would be a mistake to think that these embedded values are necessarily realised when technology is used. The bringing together (assembly) of different entities has effects that cannot be anticipated. These nonhuman entities cannot be seen as passive instruments that are used for predefined purposes. They should rather be seen as mediators that inevitably shift the purposes for which they are employed.

Agency and performance

Another important insight of ANT and SST that flows from this notion of agency is the view that practices perform or enact realities. As reported by Law, STS and ANT scholars Latour and Woolgar found in their ethnographic investigations of laboratory work, that no separation could be made between (a) the making of particular *realities*, (b) the making of particular *statements* about the realities and (c) the creation of *instrumental, technical and human configurations and practices*. Instead, *all are produced together* (Law, 2004).

Reality is not found, but made through heterogeneous practices among which are knowledge practices. Such a performative notion of reality is in contrast to a representative view. According to the latter, reality is independent of human actions and reliably represented through scientific statements. In contrast to this, Law shows that the existence of an independent reality does not occur outside scientific endeavours. Cordella and Shaikh (2003, p.9) state that “in a sense reality becomes ‘real’ when actors interact”. The performative nature of practices (such as academic disciplines) is illustrated by Callon (1998) in the case of economy. He shows how the economy is co-produced by the academic field of economy. Similarly, education does not simply represent or reproduce any existing world, but it continuously performs reality. Reality is therefore

constructed, but not in a pure social (human) way since the real does not coincide with human meanings and projections. The heterogeneous construction of reality refers to the participation of both human and nonhuman entities in the establishment of the real.

Through particular educational practices reality emerges as static or as fluid, as traditional or as progressive. Education should therefore not simply be seen as the initiation of learners into an existing reality, but it enables learners to participate in the performance of particular kinds of realities. Education performs the realities of knowledge, learners, and teachers and of a certain kind of society. To use a typical binary perspective, we could see how education at times performs learners as passive and dependent, and at other times (or simultaneously) as active constructors of knowledge and flexible participants in the learning society. Knowledge is not the outcome of 'purely' cognitive processes, but it is produced in the classroom through particular sociomaterial practices.

A further implication of this dynamic and performative view is that different realities are being performed through different practices. This is illustrated in the medical research of Mol (2002) where she explains how different diagnostic and treatment practices produce different realities of lower-limb atherosclerosis. It is an error to assume that, since one concept (lower-limb atherosclerosis) is being used, there must be a single underlying reality. She shows how one reality of lower-limb atherosclerosis is performed in the consulting room, another in the pathology laboratory, another in the radiology department, another through an angiograph and still another reality in the operating theatre. This does not imply a relativistic fragmentation of realities since comparisons, translations and associations are always possible between them. There are sometimes overlaps, but at other times contradictions between these different versions of reality which prevent them from being added up to a whole consisting of parts.

Education therefore does not simply represent a (static) reality, but participates actively in the enactment of realities. Sørensen (2009) shows how different realities are being performed in education through the constitution of different kinds of learning spaces which she describes as 'region', 'fluid', 'network' and 'resonance'. Each of these learning spaces is sociomaterially established and performs different realities. In regional space, for example, the reality that is performed consists of clear boundaries between the inside and outside (what is valid knowledge, or who are the pupils in the classroom)

and of the homogeneity of those on the inside. This space produces a representational form of knowledge which is independent of the learner. An entity such as the blackboard contributes to the performance of this space because what is written on the black board obtains official status. In fluid space, on the other hand, knowledge is not fixed, stable and coherent, but consists of shifting interconnected parts that do not correspond with an independent reality. In this particular investigation fluid space is performed when pupils use computers and the internet to build a virtual world. The teacher is not the possessor and distributor of knowledge any more, but rather a co-learner. From the discussion of these two examples, regional and fluid space, it could be seen that the different learning spaces perform different definitions of valuable education and of appropriate educational content. Regional space, however, is performed by a traditional classroom where desks, door, blackboard, teacher, students participate in the enactment of a particular kind of reality. The reality is different when students utilise computer technologies.

The ways in which different realities could be performed also mean that education itself does not remain the same. Versions of the nature, aims, preferred strategies and organisations of education are enacted in every kind of learning space. The reality of education in one sociomaterial context is different from the reality in another with the result that general statements about education could only be done if the specificity of a particular location is being reduced. Education does not represent a pre-existing world and it is not the process through which learners are socialised into something that already exists.

Judging actual, emergent and imagined realities

Not all the realities that are being performed could be judged as educationally beneficial. It is important for educators to establish what the actual and emergent effects of the sociomaterial arrangements are in order to define and establish their own agential role. It is also important for educators to imagine different realities that may be educationally more valuable and sound. The responsibility and agential role of the educator relates to his/her close scrutiny of the realities that are being performed and his/her imagining of different realities.

This role of the educator is not made possible by the way constructivist, instrumentalist and substantivist (deterministic) views of materiality in general and technology in particular provides clear predictions of the effects of new assemblages. According to the constructivistic and deterministic view as represented by Selwyn (2007), market-driven technology will inevitably lead to the production of the flexible worker. Such generalised statements cannot be made if technology is seen as part of a heterogeneous practice through which realities are uniquely enacted. The sweeping statements of many claims about technology do not refer to realities that are actually being enacted, but they deduce from their beliefs about the nature and functioning of technology what the effects would be. There is, for example, nothing within mobile technologies that **would** lead towards the autonomous learner or towards the aims of the capitalist society. Although ‘affordances’ (Norman, 1990) are design features of technology, they do not determine any particular effect. Technology is what it is designed to be, but also what it becomes within a particular practice. Technology is both a subject and an object: it both contributes towards the shaping of assemblages and it is also being shaped in the process.

In the absence of insight into the true nature and necessary effects of any technology, we need to develop finely tuned empirical and analytical tools to identify and describe the actual and emergent realities that are being performed. Such tools are being developed in the ethnographies of STS and ANT. The basic approach of these tools is to follow the actors wherever they are and wherever they go (Latour, 1996). The tools provide the means to establish how assemblages come into being and what their effects on the different entities are. The notion of agency within these traditions makes it possible to establish the effects of both humans and technologies without reverting to underlying structures or framing ideologies.

Such an a-theoretical empirical approach should make it possible for educators and educational researchers to trace in their own practices the actual and emergent effects of the socio-technical assemblages. They should be able to trace how the identities of learners are being shifted, or what kinds of knowledge are being favoured or what kinds of roles are attributed to teachers and learners. It is essential to this kind of ethnographic approach that prior judgements are not made about the role of technologies, but that an openness exist about the emergent realities. This dynamism is related to the shifting nature of agency within an assemblage and the impossibility to predetermine or contain any agent.

This openness towards new realities does not mean that everything that emerges is educationally sound or valuable. Neither conservative nor progressivist approaches are able to recognise and evaluate these realities. A conservative attitude resists all innovations which threaten traditional, well-established educational purposes. Education is seen as already established, the 'old truths' and 'established methods' only have to be reasserted in the 'back to basics' approach. A progressivist attitude on the other hand tends to embrace optimistically and uncritically everything that emerges and it imagines education without boundaries that is self-managed. Although these differences are posed here in a simplistic and dichotomous way, traces of these attitudes are present in approaches to technology. The conservative attitude is unable to recognise the emergent nature of education which continually produces new realities. The choice that the conservative makes is not between the (well-established) real and the virtual, but between a known reality (status quo) and emergent ones. In this sense not much of a difference exists between some of the critical and the market-orientated accounts of education and technology. Both tend to promote a preferred and known reality and resist realities that may emerge and that may challenge their *a priori* positions. Critical accounts operate with a human-centred reality characterised by their notions of freedom, autonomy and authenticity. Market-orientated approaches work with a notion of the 'flexible' worker and 'information literacy' as the true aims of education. They refuse to acknowledge that human nature and society do not remain intact once technological entities are introduced. It has to be accepted that education will continue to be mediated by various materialities and that its very nature has to be continually reconsidered.

For the progressivists, on the other hand, change is the only good and needs to be embraced. But, here we also have to be careful. How should the emergence of realities be evaluated if we cannot appeal to some kind of transcendental or ahistorical good? The critical approaches remind us continually that evaluation is essential, particularly in the light of the oppressive and also the excluding implications of some realities (Star, 1991). We are left with the question of what 'education for all' means when both 'education' and 'all' are shifting entities. Judgements have to be made about the educational value of each assemblage brought about by new technologies. Questions continually have to be asked, whether a quality education for all is made possible through the introduction of new technologies. This requires an Aristotelian 'practical judgement', which does not appeal to universal definitions or values, but attempts to establish the good within the particular contexts.

While actual and emergent realities render the educator still in a relatively passive position, an important aspect of his/her agency comes to the fore in the imagining (Verran, 2007) and enactment of different realities.

Verran (1999, 2001) reports on her experiences as teacher-educator in a Nigerian mathematics classroom. While observing the lesson of one of her students she became disconcerted that he was not following their carefully rehearsed preparation at College. He did not explain measurement as extension, as it is understood in western mathematics, but as repetition. A typical extension-approach would use a ruler where measurement is displayed in terms of discrete and accumulating quantities. Instead of this approach, in this lesson the student was using a piece of string with which to measure the length of children. He then used a 10cm wide card and was counting aloud with the class the number of times the string could be wound around the card. This is then multiplied by 10 to give the total length, adding the rest. Verran was disconcerted because the student had diverted from the way they had practised this lesson at College and was introducing a different enactment of measurement which goes against the 'western logic'. This material enactment of measurement as repetition immediately appealed to the children to the extent that many of them used their cards and string to carry on the measuring activities outside school. Upon reflecting on the success of the lesson and her own disconcertment, Verran came to the realisation that a different understanding of a fundamental mathematical concept and of reality itself was being enacted and that this emergent reality provided an important alternative to dominant western forms. She concludes that such disconcertment that was triggering 'laughter' in class among students and teacher, is an essential quality of the educator who should be able to recognise and imagine different realities as this student teacher had succeeded in doing.

While the tracing of actual and emergent realities requires an empirical research attitude, the 'imagining' wants to be divorced from the dominance of the present by questioning our basic ontological and moral assumptions. It is an anticipation of possible futures that are different from pasts. But this imagining is not a purely mental activity since it is already induced by our entanglement with material agents such as technologies. The educator finds him-/herself within heterogeneous assemblages from where new realities and moralities could be imagined and enacted. This imaginary enactment of possible futures is also a form of critique which does not simply refer to contradictions or a false consciousness, but which enacts a different (sociomaterial) reality. Far from being only a mental activity, the imaginary is

made possible by the kinds of fluid spaces on which Sørensen (2009) reports. As a fluid space different components of education are not tied down in a fixed way, but with regard to the Zimbabwean bush pump (De Laet and Mol, 2000), components could be replaced or changed. Agency within such fluid space requires the ability to recognise valuable educational outcomes that are not given in policy documents or prescribed in criteria of performativity.

Conclusion

It has been argued that the agency of the educator cannot be understood in either a modernistic or postmodernistic way, but has to be located within heterogeneous assemblages. Although the principle of symmetry states that no *a priori* distinction could be made between different agents, it is necessary and possible to produce a particular kind of agential educator in spite of the ways in which the educator may be interpellated as a certain kind of subject or disciplined through technologies of appraisal and surveillance, or the intensification (Apple, 1986) of their work or their defensive strategies. It requires a particular kind of educator who continually looks out for what is educationally sound in each emergent reality and whose imagining could contribute towards the enactment of new realities. Educators should be able to make complex decisions that entail the following:

- (a) The identification of new realities that might emerge. This requires a finely tuned awareness when something different emerges. Such fine-tuned sensitivities are displayed by Verran (1999) and Sørensen (2009). In the development of a postcolonial approach, Verran became aware of such differences when confronted with the experiences and conceptions of reality and different logics of Yoruban (Nigerian) learners when compared to the conceptions of reality and logic of western mathematics. In her analysis of classrooms Sørensen describes how different forms of knowledge and identities are produced when learning space is configured differently.
- (b) These educational outcomes have to be evaluated, not against fixed criteria of the essence of education, but against emergent notions of educationally valuable outcomes. It cannot be assumed, as is done in critical approaches, that the 'flexible worker' or the 'information literate' is simply produced for the benefit of the market and does not

reflect a possible legitimate way of being. If human nature is not essentially given, it cannot be said in a definitive way what education could or could not be.

- (c) The imagining of futures that are different from pasts and the enactment of such realities in sociomaterial ways. This entails among others the involvement of educators in the design of technology that is sensitive to the complexity of learning ontologies in the classroom.

The soundness of education has to be established in relation to the realities that are being enacted. The central question is whether education enables learners to participate in the enactment of realities. It is therefore not appropriate to evaluate the role of technology in isolation from the reality(ies) enacted in education.

The gist is that we (humans) are not the product of our technologies although we are produced by our assemblages. The sense of being performed does not entail human passivity which in itself is already a particular kind of heterogeneous performance. We need to contribute towards and participate in those kinds of assemblages that would promote appropriate kinds of participation and learning. The nature of agency of the educator is paradoxical: the agent is neither the centred human presented by humanism, nor a mere place holder as presented in structuralism or the product of libidinal drives. While agency is produced within heterogeneous networks, it is also possible to imagine those kinds of assemblages that may make better human forms and ecologies possible. The promotion of such assemblages requires the right kind of disposition informed by a certain conceptualisation of technological or other material learning spaces. While the determinist and instrumentalist views are not helpful, educators have to understand their place within a heterogeneous assemblage where they are not necessarily the central agents.

This article has started to explore the nature and possibilities of educator agency by focusing on the individual educator within a particular locality. The critical importance of such 'local spaces of innovation' is emphasised by Bowker and Star (2000, p. 232) by retaining "intimacy in its detailed knowledge of the nuances of practice". The fluid nature of any assemblage makes such spaces possible. This focus on the educator does not represent a micro-perspective in opposition to the macro-perspective of policies and economic forces. The assemblage which produces the educator's agency

already consists of ‘macro’ agents such as policies and market demands. The agency of the educator has to be augmented with an analysis of how this agency could be enhanced through its connectedness in larger heterogeneous assemblages which might contribute to its mobility and endurance. The continual risk that his/her interests will be mistranslated in these assemblages forces the educator back to renewed judgements about appropriate educational content and valuable outcomes.

References

- Apple, M.W. 1986. *Teachers and texts. A political economy of class and gender relations in education*. London: Routledge.
- Barad, K. 2003. Posthumanist performativity: toward an understanding of how matter comes to matter. *Signs*, 28(3): pp.801–831.
- Berg, M. 1998. The politics of technology: on bringing social theory into technological design. *Science, Technology and Human Values*, 23(4): pp.456–490.
- Bowker, G. and Star, S. 2000. *Sorting things out: classification and its consequences*. Cambridge, MA.: MIT Press.
- Callon, M. 1986. Some elements of sociology of translation: domestication of the scallops and the fishermen of St Brieuc Bay. In Law, J. (Ed.), *Power, action and belief: a new sociology of knowledge?* London: Routledge and Kegan Paul, pp.196–233.
- Callon, M. 1998. Introduction: the embeddedness of economic markets in economics. In Callon, M. (Ed.), *The laws of the markets*. Oxford: Blackwell, pp.1–57.
- Conlon, T. 2000. Visions of change: information technology, education and postmodernism. *British Journal of Educational Technology*, 31(2): pp.109–116.

Cordella, A. and Shaikh, M. 2003. Actor network theory and after: what's new for IS research? Proceedings of the 11th European Conference on Information Systems, Naples, Italy. Available at <http://www.informatik.unitrier.de/~ley/db/conf/ecis/ecis2003.html>.

De Laet, M. and Mol, A. 2000. The Zimbabwe bush pump: mechanics of a fluid technology. *Social Studies of Science*, 30(2): pp.225–263.

Department of Education. 2003. Draft White Paper on e-learning. Transforming learning and teaching through ICT. Pretoria: Government Printers.

Heidegger, M. 1977. *The question concerning technology*. New York: Harper & Row.

Latour, B. 1994. Where are the missing masses? The sociology of a few mundane artifacts. In Bijker, W.E. and Law, J. (Eds), *Shaping technology/building society: studies in sociotechnical change*. Cambridge: MIT Press, pp.225–258.

Latour, B. 1996. *Aramis, or the love of technology*. Cambridge, Mass.: Harvard University Press.

Law, J. 1994. *Organizing modernity*. Oxford: Oxford University Press.

Law, J. 2004. *After method: mess in social science research*. London: Routledge.

MacIntyre, A. 1981. *After virtue*. Notre Dame, Ind.: University of Notre Dame Press.

Mol, A. 2002. *The body multiple: ontology in medical practice*. Durham, NC: Duke University Press.

Nespor, J. 2009. Devices and educational change. *Educational Philosophy and Theory*. Online first doi: 10.1111/j.1469-5812.2009.00611.x

Norman, D. 1990. *The design of everyday things*. New York: Doubleday.

Pickering, A. 1993. The mangle of practice: agency and emergence in the sociology of science. *American Journal of Sociology*, 99(3): pp.559–89.

Plato. n.d. Phaedrus. *The internet classics archive*. Retrieved September 16, 2011, from <http://classics.mit.edu/Plato/phaedrus.html>

Selwyn, N. 2007. Plus ca change, plus c'est la meme chose – considering the possible futures of educational technology. In Kritt, D. and Winegar, L. (Eds), *Education and technology: critical perspectives, possible futures*. Lanham: Lexington Books, pp.31–46.

Sørensen, E. 2009. *The materiality of learning*. Cambridge MA.: Cambridge University Press.

Star, S. 1991. Power, technologies and the phenomenology of conventions: on being allergic to onions. In Law, J. (Ed.), *A sociology of monsters. Essays on power, technology and domination*. Sociological Review Monograph London: Routledge, pp.26–56.

Star, S.L. 1995. Introduction. In Star, S. L. (Ed.), *Ecologies of knowledge: work and politics in science and technology*. Albany, NY: State University of New York Press.

Suchman, L. 2007. *Human-machine reconfiguration: plans and situated action*. Cambridge, UK: Cambridge University Press.

Verran, H. 1999. Staying true to laughter in Nigerian classrooms. In Law, J. and Hassard, J. (Eds), *Actor network theory and after*. Oxford: Blackwell, pp.136–155.

Verran, H. 2001. *Science and an African logic*. Chicago, IL: University of Chicago Press.

Verran, H. 2007. The educational value of explicit non-coherence: software for helping Aboriginal children learn about place. In Kritt, D. and Winegar, L. (Eds), *Education and technology: critical perspectives, possible futures*. Lanham: Lexington Books, pp.101–124.

Dirk Postma
Faculty of Education
University of Johannesburg

dpostma@uj.ac.za