Regenerative Capacities: New Materialisms, Inheritance, and Biopolitical Technologies in Education Policy

Ezekiel J Dixon-Román

Available at: https://works.bepress.com/ezekiel_dixon-roman/25/
Regenerative Capacities: New Materialisms, Inheritance, and Biopolitical Technologies in Education Policy

Ezekiel J. Dixon-Román

University of Pennsylvania

This is an Accepted Manuscript of an article published by Taylor & Francis in Equity & Excellence in Education on December 15, 2017, available online: https://doi.org/10.1080/10665684.2017.1399098.
Abstract

Inheritance and social reproduction have been widely theorized and studied concepts in the social sciences. What is assumed in theories of social reproduction is a focus on social position and identity; a focus on moving from one position to another at the cost of overlooking the rich and arguably more important movement, process, and flow in between. Turning toward new materialisms for theoretical insight, this article points toward an alternative post-humanist perspective. Leaning on Massumi (2002) and Puar (2007), the author asserts that expanding the analytical focus to include the movement and process of biopolitical capacity will further sharpen the (new) materialist analysis of force and power relations, what Puar (2007) refers to as *regenerative capacities*. It is through the employment and performative force of biopolitical technologies in education policy, the author concludes, that enables the surveilling, managing, and demarcating of regenerative capacities that constrain the movement, process, and potentialities for/of social change.
the investment in the identity of the limit, a limit that separates human exceptionalism (with its cultural misrepresentations) from the substantive reality that it can’t know and can’t be, has prevented us from appreciating that our corporeal realities and their productive iterations are material reinventions. Life reads and rewrites itself, and this operation of universal genesis and reproduction is even internal to the tiny marks on this page, which are effective transubstantiations.

—Vicky Kirby, *Quantum Anthropologies*

Inheritance has been understood as one of the necessary and significant processes of biology, generally and the human organism specifically. The evolution of various species, material phenomena, and living organisms, for instance, necessitate reproduction. The philosophical and theoretical understandings of the reproducing processes of inheritance have rested on a radical division between nature and culture. This radical division understands nature to be made up of fixed, essential, prescripted, and predetermined characteristics of matter in the world; and, culture refers to the processes of meaning making, communicating, learning, and practices. It is this conception of the ontology of nature that has undergirded theories of inheritance, social reproduction, and educational and social policy.

While various perspectives have been articulated in the social and biological sciences on inheritance, this article takes up new materialist perspectives that assume nature is culture and the human an entangled ontological expression of Earth’s becoming (Kirby, 2011). How might an alternative ontology of the material body provide more nuanced understandings of critical theories of social reproduction? How might we rethink the study of social reproduction in light of a theoretical understanding of the world as always in movement and process? And, in what ways might the capacities of these corpo-realities always-already be demarcated, regulated, and
managed by the biopolitical technologies of quantification in educational policy, cloaking the performative work of the new eugenics? This is a dangerous cloaking that works within the unseen modulating mechanisms of the algorithms of societies of control (Deleuze, 1992). These unseen algorithmic modulating mechanisms portray choice and Western ideals of freedom while controlling access to information, resources, and opportunities and socially demarcating what and who’s capacities to regenerate.

In this article, I lean on work in new materialisms, particularly Vicky Kirby, Karen Barad, and Iris van der Tuin to reconceptualize the ontology of matter, as well as present my new materialist rethinking of the forces of inheritance. I argue in this article that an expanded analytical lens on the movement, process, and flow of the world is needed in order to sharpen materialist analyses of power relations and social change. This is especially germane in our contemporary moment of the computational turn (de Freitas & Dixon-Román, 2017; de Freitas, Dixon-Román, & Lather, 2016), a paradigm shift that better accounts for the generative agencies and materialities of algorithmic acts and software practices in society. The computational turn is of particular importance for education as the methods and practices of digital technologies are transforming education via online courses, video game assessments, learning analytics, smart schools, smart classrooms, digital lockers for college admissions, as well as the use of predictive analytics to inform policy practices and decision making, just to name a few. It is via the interpellating of identity and difference via technologies of measurement and the unseen modulating mechanisms of algorithmic acts that cloak new iterations of eugenics practices, producing data informed practices that constrain possibilities for education and social change.

New materialists’ focus on process and the body has important implications for the study of social reproduction. Through assemblage theory, race, gender, sexuality, class, and dis/ability
are thought of not to be identities or characteristics of the human but rather as events that consist of relations and connections, that intra-lace the material ontologies of the body with discursive formations, and emerge secondary to the material flow of events (Deleuze & Guattari, 1987; Massumi, 2002; Puar, 2007). What is assumed in theories of social reproduction is a focus on static social position and identity; a focus on moving from one position to another at the cost of overlooking the rich and more important movement, process, and flow in between (Massumi, 2002; Puar, 2007). In order to unpack these interventions, I work through van der Tuin’s (2015) and Nash’s (1978) etymological analysis of the two associated products of inheritance: genealogy and generation. As we will see, both of these concepts etymologically point us back to Indo-European root *gen* which means “to come into existence”. In order to better account for the movement, process, and forces of the world, new materialisms posits that we have to account for, in part, the movement and processes of the body. Thus, I turn to Massumi (2002) and Puar (2007) to argue that shifting the analytical focus from position to the movement and process of biopolitical capacity will further sharpen the (new) materialist analysis of force and power relations, what Puar (2007) refers to as *regenerative capacities*. In this paper, generative force, or generation, is articulated as onto-epistemological movement and process of matter, materiality, and the body. As the main regulating mechanisms of societies of control (Deleuze, 1992), I then discuss how the biopolitical technologies of quantification, from testing to administrative data analytics to learning analytics, in education policy demarcate what bodies have the capacity to regenerate, constraining the movement, process, and flow for/of educational equity and social change.

**New Materialisms: New Theoretical and Empirical Knowledge of Matter**

As the process by which life, power, inequality, and difference are reproduced,
inheritance has long been of both philosophical and scientific interest. The dominant positivist and sociocultural perspectives in the social sciences on inheritance understand the categories of nature and culture as separate and irreducibly different (Dixon-Román 2017). While culture has referred to intellection, learning, communicating, and meaning making, nature has been characterized by a Cartesian definition of matter as “corporeal substance constituted of length, breadth, and thickness; as extended, uniform, and inert” (Coole and Frost 2010). It was this definition of matter that became constitutive of the natural world in Modernist thought and the analytical basis for both the natural and social sciences.

The developments in the biological sciences have paralleled and been influenced by the discoveries in the physical sciences on matter. Complexity theory, quantum physics, and chaos theory have all challenged Modernist conceptions of matter. New materialists have taken these developments seriously, moving away from conceptions of matter as an inert substance that is subject to the forces of predictable causal processes. For new materialists, matter is active, vibrant, creative, and dynamic (Barad, 2007; Bennett, 2010; Coole and Frost, 2010; Deleuze & Guattari, 1988; Kirby, 2011; van der Tuin, 2015). Agency is no longer understood to be simply situated within the realm of the human.

New materialists have revisited some of the well-studied natural science theories and research of the twentieth century that have challenged the assumptions of solid, inert matter (Alaimo and Hekman, 2008; Barad, 2007; Bennet, 2010; Coole and Frost, 2010; Deleuze & Guattari, 1988; Kirby, 2011; van der Tuin, 2015). For instance, Karen Barad (2007) reads theoretical and empirical work in quantum physics through post-structuralist theories of the discursive to reconceptualize the ontology of matter. She rethinks the discursive as a process of material reconfigurings of the world via a process of iterative intra-actions. Intra-action (rather
than interaction) is a performative process of mutual constitutions between objects or agencies within phenomena. For Barad, matter

“…is substance in its intra-active becoming—not a thing but a doing, a congealing of agency. Matter is a stabilizing and destabilizing process of iterative intra-activity. ...

“Matter” does not refer to an inherent, fixed property of abstract, independently existing objects: rather, “matter” refers to phenomena in their ongoing materialization” (Barad 2007, p. 151).

Thus, the body is *mattering matter* and the materialization of the body is an iterative intra-active process of becoming.

Moreover, new materialists posit that matter (nature) and meaning (culture) are inseparable and profoundly entangled. Building on Barad (2007), Kirby (2011) states that entanglement “suggests that the very ontology of the entities emerges through relationality: the entities do not preexist their involvement” (p. 76). In other words, cultural processes are not predated by nature but rather are nature. This entanglement of the world, of which we are not outside viewers of but rather always inside relational observers of the world’s in-process ontological fabric, co-constitutively transforms both the object of inquiry and the human observer. Thus, it is a challenge both ontologically and epistemologically of how we analyze and produce knowledge of the phenomena of inheritance and social reproduction.

The new materialist understanding challenges us to further consider non-fixed, non-linear, and shifting material reconfigurings of time and space. The ontologies of the human organism go beyond the discursive processes of the mind to the corpo-realities of the material body as well. As Kirby states

"...something counter-intuitive and quite threatening to humanism and human
exceptionalism begins to make its appearance if we suggest that the object is also the subject 'who' interprets, which in turn implies that authorship of the model/interpretation is an involvement wherein epistemology was always inherently ontological." (Kirby 2017, p. 10)

This has direct implications for how we understand the process of inheritance, as a world writing and rewriting itself, producing material and discursive reconfigurations, where the observing subject is entangled with the object of inquiry.

As a way to rethink inheritance from a new materialist perspective, I have developed what I call the forces of inheritance (Dixon-Román, 2017). These forces include (though not limited to) double injunction and the material-discursive force of inheritance; the timespace of inheritance; and the assemblages of inheritance. Leaning on Derrida’s (Derrida & Roudinesco, 2001) double injunction of inheritance and Barad’s (2007) posthumanist performativity, I argue that inheritance is a mutually constituting material-discursive process of double injunctions. These double injunctions include the simultaneous process of being chosen and materially and discursively constrained choice or being appropriated and reappropriating. Inheritance are material-discursive forces that are continuously reconfiguring the boundaries of both possibility and impossibility. The material conditions of inheritance come to matter in and through the ongoing iterative intra-acting performative acts. The iterative intra-active reconfiguring of matter marks and produces the entanglement of time and space. Drawing from Kirby’s (2011) deconstruction of timespace, I argue that the (re)appropriations and material reconfigurings of inheritance are always origin’s complex and differentiated identity with/in itself. These forces of inheritance are not without social context, process, or events. Thus, with Puar (2012), I employ assemblage theory to reread intersectionalities. As a material and discursive process that is
entangled with the reconfigurings of timespace, the (re)appropriations of inheritance are part of the relational and connective process of assemblages. Social categories such as race, gender, and class are situated in events, acts, and situations rather than characteristics of the entangled human subjects, of which the observing subject of inquiry is mutually constituted. It is via the processes of assemblages that form and shape social reproduction in the forces of inheritance, enabling or constraining the aporetic possibility of justice.

New materialisms and the forces of inheritance assume a material world that is always-already reconfiguring and in process of becoming. Thus, the body is not understood to be inert or made up of fixed and prescripted essentialist properties but rather vibrant and dynamic. The body is a composite of myriad relational ontologies that include cells, organisms, bacteria, organic, and inorganic material, and the entanglement of the bodies that live within and outwith the body. This new materialist ontological reconceiving of matter and the body has implications for how we make sense of social reproduction and the doing of generations. As will be discussed later in this paper, this may be by way of sociotechnical systems of education that inform the transactions of teaching and learning, with a focus not on static traits of the student but rather generatively forming and shaping the educative process.

Toward Regenerative Capacities

If the body is not made up of fixed matter with prescripted characteristics but rather an ongoing process of iterative intra-actions then it is necessary to reconsider how social reproduction, as a product of the social process of inheritance, has been studied in education. Although I offer a new materialist rethinking of inheritance this work leaves us to wonder about how critical theories of social reproduction in education have focused our analysis on identity and positionality at the cost of overlooking the world in process in between. That is, how might
alternative ontologies of the material body, as always in process, complicate the ideological interpellations of identity and positionality of social reproduction, processes that suggests a cultural freezing of the movement and process of the world? As related concepts of the process and products of inheritance, I begin engaging this question by examining the etymology of genealogy and generation. Examining the etymology of genealogy and generation provides further insight into the products and processes of inheritance on the regeneration and sedimenting of power, inequality, and hierarchized difference. With the focus on the relational ontologies of the body, I then move to an analysis of critical theories of social reproduction, arguing for an expanded analytical focus to include regenerative capacities. By theoretically examining new materialist implications for social reproduction, I will further illuminate what’s at stake in overlooking the movement, process, and flow of the material reconfigurings of the body.

*Etymology of Genealogy and Generation*

Genealogy and generation have long etymological histories in association with inheritance. While genealogy often refers to the fractal pattern of familial histories and ancestries, the word has also been used ontologically to understand being in the world and to organize time. In Laura Nash’s etymology of generation she argues that “…the schematic potential of the genealogy is strong, both to explain the nature of things (“coming into existence”) and to organize long periods of time” (Nash p. 16). Broken down into Greek prefix and postfix, Nash (1978) states that genealogy refers to “the account (logos) of the generations (genea)” (Nash, 1978, p. 16). For post-structuralism, genealogy is more commonly associated with Foucault (1972) and understood as a method of inquiry that excavates and traces the ruptures, struggles, and multiplicities of a word, concept, or discourse, against linear and teleological narratives of history. Genealogy thus has had both ontological and epistemological
accounts in relation to being a product, organizer, and method of inquiry.

In order to further study the etymology of genealogy, Van der Tuin (2015) differentiates between the *gen* and *ge* prefixes. She links *gen* or *genoi* with generation and actuality; while drawing the relations between *ge*, *geo*, or *gaia* of geophilosophy and virtuality. Leaning on Deleuze and Bergson, Van der Tuin argues that the dualism between *gaia* and *genoi* needs to be made use of given their connection. She posits that “This virtuality – in my reading – is generation. *Gaia* gives rise to generation and the generated *genoi* grows apart from *gaia*. In other words, *the process at work is generation.*” (van der Tuin 2015, p. 62). Gaia is an always-already in process world, while genoi emerges as temporary sedimentations from gaia. What interest me most here for accounting for the new materialist ontology of the body, as a composite of vibrant and dynamic material, is the process at work of generation.

Generation is often deployed in two linguistic contexts: (1) a relative association or affiliation with a particular grouping, often by age or birth, and (2) acts, processes, and cycles of life, productivity, and creativity. The Indo-European root *gen* in generation and genealogy fundamentally means “to come into existence,” which is also found in the verb *genesthai* “to come into being” (Nash 1978; van der Tuin 2015). Yet, Nash argues that there is a paradox of the word *genesthai*. The paradox is that of a clear distinction in lineage from parent to child but there always being movement in that shifting threshold as child-becomes-adult. Thus, van der Tuin argues with Bergson that “…there is becoming from the child to the man” (Bergson[1907]1998, 313), which shifts the generational configuration or demonstrates how *generationality – at the core – deals with movement*” (van der Tuin 2015, p. 63; emphasis added). As mentioned previously, genealogy has consisted of both ontological (coming-into-existence and time) and epistemological (rational ordering) uses. Thus, van der Tuin posits that genea is an entanglement
between ontology and epistemology “whereby process holds priority over, or carries, sedimentation” (p. 64). And, as Baker (2004, 2005) delineates, the gen-root is also associated with the word genius and its relationship to a contested history of race, gender, class, and the discursive formations of the intellectually inferior and feebleminded. It is the movement of genealogy that I am most interested in here, as this process is what accounts for the regeneration and sedimenting of power, inequality, and hierarchized difference in the gen-root.

Understanding generation as consecutive teleological cohorts takes the movement and process of emergence out of genealogy. Studying the movement of generativity would entail a focus on “the nonlinear link between the immediate and the so-called heroic past, between embodied memory of genealogical movement and disembodied Knowledge of paternal lineage” (Nash, 2015, p. 65). A nonlinear link here refers to a nonsimple, complicated, and differentiated past-present, a material trace or enfolding and reconfiguring of timespace. Indeed, the study of generativity is always in part about the movement, process, and flow of matter, materiality, and the body. Given the focus of this article on new materialist conceptions of the body and their implications for social reproduction I now turn to a more focused development of the body and the capacities to regenerate.

**Regenerative Capacities**

Although the body has long been of interest to critical theories (especially post-structuralism) (Bourdieu, 1980; Butler, 1993; Deleuze & Guattari, 1988; Foucault, 1977), few have ontologically conceived of the body as always-already agentic or a composite made up of myriad relational ontologies. Many of these theories have treated the matter of the body to be inert and a materialization of discursive forces (Barad, 2007; Deleuze & Guattari, 1988; Massumi, 2002; Kirby, 2011, 2017). Moreover, critical theories of social reproduction
necessitate a focus on the ideological interpellations of identity and positionality in order to delineate enabled or constrained mobility from one position to another (Massumi, 2002; Puar, 2007). But, as argued by Massumi (2002), the focus on “positionality begins by substracting movement from the picture” (p. 3). This is a dangerous subtractions, as it is in the process and movement where social change occurs.

Post-structuralist theories of reproduction have rested on a cultural construction, discursive formation, or ideological interpellation of the body. These theories have been profoundly helpful for critically analyzing and deconstructing the reproduction of structural relations of race, gender, class, sexuality, and disability. In these theories, the key ground of contestation is the body. It is the body that is discursively formed and shaped and the site of a multiplicative grid of identity and difference interpellations. However, with exceptions (Deleuze & Guattari, 1988), many post-structuralist’s accounts of the body as a discursive formation rendered the material body as endogenous to the causal forces of culture, maintaining bodily matter’s Cartesian ontological identity. This ideological interpellation of the body and limited ontological account of the material body can be found in various applications of intersectionality theory. Thus, not only was the ontological account of the material body inadequate but the focus on identity and positionality overlooked and missed the more important movement and process of the body (Massumi, 2002; Puar, 2007).

As has been argued in this paper, the material body is a composite of the movement and process of relational ontologies. As informed by biosemiotics, new materialisms postulate that the body is not prescripted and running on a calculated logic based on an amorphous Being but rather made up of a multiplicity of organisms with relational ontologies that are navigating the world by reading, interpreting, and translating the various signs and codes of information in the
world within temporal and spatial context (Dixon-Román, 2017; Hoffmeyer, 2008; Kirby, 2011). Although sedimentations do emerge and exist in the world they are not static, nor are they inseparable from the movement and process of the body. Sedimentations emerge secondary from a materially and discursively shaped indeterminate movement and process of the body, analogous to points on an infinite line (Massumi, 2002). Massumi (2002) posits that the emergence of identities and positionalities are not ontologically prior to the passage and process of an event but rather are retrospectively back formed. Thus, identities and positionalities do emerge, but ontologically secondary to the passage and process of the body and an event. As was discussed earlier, identities and positionalities emerge as relations and connections of events or situations but not characteristics of the human. Given that the movement and process of the body is ontologically primary to identity and positionality we must consider an expanded analytical focus on biopolitical capacities that includes both reproducing (position) and regenerating (process). As Puar (2007) states “…what is at stake in terms of biopolitical capacity is therefore not the ability to reproduce, but the capacity to regenerate…” (p. 211). While reproduction is focused on the change and constraint of positionality from one timespace to another, regenerating is focused on the enabled or constrained capacities of bodily movement, process, and flow.

Moving toward the study of regenerative capacity is even more apropos for research on education and human learning and development, where the biopolitical technologies and practices explicitly enable and constrain, demarcate and delineate capacities. The focus of such analyses is to “understand how the biopolitics of regenerative capacity already demarcate

---

1 Biopolitics is most commonly associated with French philosopher Michel Foucault to refer to the forces and processes of managing, shaping, controlling, and surveilling bodies and human life by regimes of authority of power/knowledge.
racialized and sexualized statistical population aggregates as those in decay, destined for no future based … on what capacities they can and cannot regenerate and what kinds of assemblages they compel, repel, spur, deflate” (Puar 2007, p. 211). Capacity is a concept Massumi (2002) borrows from Spinoza to refer to the bodily “power (or potential) to affect or be affected”, where the body is conceptualized to be a relation between movement and rest, a relation of transition (p. 15). These are capacities that are not encompassed by the psychometric measure of metaphysical constructs of reasoning. This shift entails the biosocial inquiry into bodily movement and processes with an entangled world. Refocusing the analysis from position to process, regenerative capacities further sharpens the (new) materialist analysis of force and power in education.

With the focus on analyzing bodily capacities, how they are conceived, regulated, and demarcate whose capacities are able to regenerate, it is conceivable, then, to more sharply analyze the technologies, relations, and forces that are reconfiguring and designating material possibility. Regenerative capacity is vitally important for the movement, process, and flow for/of education and social change, as it is in the bodily potentialities to affect and be affected where education and change occur. Where we see this most prominent is in the biopolitical technologies of quantification in education policy.

**Biopolitical Technologies of Regenerative Capacities**

“Far more stable is the perception of the generations of computers than generations of humankind.” (Nash 1978, p. 19)

In the above quote, Nash (1978) is referring to generation in two senses of its use: relational classification and process. The latter is of interest here because of the ways in which
the sociotechnical assemblages of education policy cloak processes of the new eugenics. As Deleuze argued, societies of control are, in part, characterized by the production and analysis of continuously and rapidly produced data across space and time, using data and statistical information as a live generative force, while also including data flows that links government administrative data with that produced in the sociotechnical assemblages of digital architectures (Deleuze, 1992; Sellar & Thompson, 2016). Societies of control consist of modulating mechanisms that control access to information, resources, and institutions, oftentimes without our even knowing. It is the unknowing of these modulating processes in relationship with the perceived array of choices provided that form and shape experiences of freedom. As I will argue here, it is the sociopolitical values that are working through the seemingly objective information of quantification and written into the modulating mechanisms of the code of the algorithms of data and learning analytics that cloak the performative acts of the new eugenics. As I will discuss below, these more-than-human performative acts of the new eugenics are part of the sociotechnical forces of regenerative capacities.

In education policy, the regulating and demarcating of biopolitical capacities to regenerate is commonplace. From ability grouping to the policy practices with administrative data analytics to the sociotechnical practices of learning analytics, the use of biopolitical technologies in classrooms, schools, and school districts are increasingly being used to intra-actively demarcate and control capacities to regenerate. Of our contemporary moment, some of the most dominant biopolitical technologies in education are psychometric measures of testing, the increasing use of administrative data analytics, and learning analytics; each of which are

---

2 New eugenics refers to reconfigured or adapted configurations of ideologies and practices that assume genetic heredity of human mental capacity and behaviors. Eugenics social theory informed ideologies of racial superiority, masculine domination, social class respectability and elitism, and heteronormativity as well as bodily constructions of the “able,” the “feebleminded,” “retarded,” “defiled,” “inappropriate,” and “deviant.”
taken up in varying degrees in education policy. Given the new materialist ontological conception of the corporeal body, how might the biopolitical technologies of quantification performatively enact boundaries of what and whose capacities to regenerate? As taken for granted technologies in education policy, it is critically important to unpack their implications for biopolitics and the regulating and constraining of education and social change.

Psychometrics measure bodily responses to a sample of stimuli in order to scale, position, and predict the capacities of bodies in time and space for purposes of enabling or constraining material potentialities such as via state exams or college admissions testing. Having its early developments in anthropometry and psychophysics, psychometrics were developed out of the eugenics movement of the early 20th Century (Gould, 1981). Substantial efforts were made to depart from these ideological origins, including the influence of postmodern thought on measurement and test theory (Mislevy, 1996). However, through the gaze on achievement gaps (Gutiérrez & Dixon-Román, 2011), the use of these measures in education policy continues to be focused on the interpellation of identity and difference; that is, the psychometric estimation and hierarchical scaling of test-taker abilities.

On almost every standardized cognitive and achievement measure, statistical population differences exist by race, gender, class, language, etc. (Reardon, 2011; Stanford CEPA, 2017). Even measures with very high stakes for enabling and constraining possibilities for social mobility (e.g., the College Board’s SAT) have been found to be tied to where one lives, what high school they attended, the family’s income and poverty status, the family’s wealth, the test-taker’s racial and gender identity, and the number of out-of-school enrichment opportunities the test-taker may have had (Dixon-Román, Everson, & McArdle, 2013; Dixon-Román, 2017; Everson & Millsap, 2004; Everson & Millsap, 2005). While one argument is to suggest that these
are all factors of society and separate from the test, this argument assumes a separability between object and subject or measurement technology and society. New materialisms not only radically parts from this but posits that the apparatus of measurement is not reduced to the instrument but is made up of an entanglement of the instrument, the material environment of testing, policy context, political economic context, sociocultural processes, sociopolitical forces, and the test preparation industry among other inseparable ontologies that make up the apparatus of measurement (Barad, 2007; Dixon-Román, 2017). Thus, the instrument of measurement is not separate and objectively measuring the construct and these social demarcations but rather the instrument is entangled with them and an active performative force enacting hierarchized difference. As that which is cloaked in discourses of educational equity, the gaze on achievement gaps is a dangerous gaze that focuses on the scaling and positioning of bodies at the cost of overlooking the more relevant and important movement and process of educational equity.

The test scores produced from psychometric measures also become part of a larger sociotechnical assemblage of administrative data. Administrative data refers to the databases that house all collected information on every pupil in the school. They contain attendance records, health records, parent information, home address, test scores, among myriad other information. Up until recent decades, administrative data was only used to collect information on each pupil that is readily accessible (Culhane et al 2010). It was not analyzed or used for policy analysis or evaluation, and has long been understood to be of poor quality due to data entry errors among other issues (Rothbard, 2013). However, with recent developments in data science, administrative data has become of greater interest for policy research, analysis, evaluation, and especially practice. Administrative data in education can now, with sophisticated record linking algorithms, be combined with the administrative data of any other policy agency including health
services, social and human services, taxes, and criminal justice. These linked administrative data form an integrated data system that could have extensive information about every person across the life course as they move through various institutions in society (Culhane et al 2010). By using traditional statistical methods, these data wells serve as sources for doing research or evaluation on the impact of policy, for whom, when, and where. By employing machine learning algorithms, probabilistic prediction or decisions can be mined from the data to inform practice.

While the analytics of linked administrative data can be a generative force for policy practices, they also performatively demarcate and delineate what bodies have the capacities to regenerate. In addition to questions of data quality, administrative data is inherently sociopolitical. The organization and arrangement of the data is spatially situated in geographic locations of racial and class homogeneity. Everyone does not pass through all institutions of society (e.g., child welfare or criminal justice) and, in societies like the United States, the educational administrative data will not include all those children who attended private schools, thus producing structural relations in who is present and surveilled in the data and who is absent. That is to say, children of affluent homes attending private schools have the privilege of not being under the surveilling and analytic gaze of educational administrative data. This makes the biopolitics of educational administrative data that much more powerful. While there are always questions and concerns of accuracy in administrative data, an audit culture or policy has not been well developed or established because of the newness of their use. Hence, when machine learning algorithms are processing and being trained on the data, the algorithm becomes what Alex Wehiliye has called a racializing assemblage (Wehiliye, 2014; Dixon-Román, 2016). That is, via the sociopolitical relations imbued in the linked administrative data, the algorithm ‘learns’ and performatively enacts in outputs sociopolitical relations that hierarchize and differentiate
bodies (Dixon-Román, 2016). The racializing assemblages of the algorithms are a seemingly objective generative force for demarcating what and whose capacities to enable by informing policy practices. This can be seen, for instance, in the use of supervised machine learning algorithms in the courts of many cities and states to predict the risk of offenders committing a violent offense. This prediction score is then used to inform sentencing decisions, one of the ultimate legal acts of constraining regenerative capacities. It is known that zipcode, prior offense, and gender are weighted more highly in the prediction models, each of which serving as proxies for race and algorithmically demarcating whose capacities to regenerate.

As another technology that forms, shapes, and manages bodies through time and space, learning analytics were designed to enable educational governance and the transactions of teaching and learning. Pearson’s Center for Digital Data, Analytics, and Adaptive Learning has been one of the leading institutions in this area. They have developed a number of new methods and technologies for learning analytics. In sum, learning analytics is the collection, analysis, and application of data accumulated to assess the behavior of educational communities. The interest is to optimize both student and faculty performance by employing a host of data analytic methods including predictive modeling, data mining, and interactive visualizations for the real-time analysis of teaching and learning transactions. They provide all stakeholders with insightful information of classroom activities over the course of a day and throughout the school year. As broadly defined by Larusson and White (2014), “learning analytics is … the effort to improve teaching and learning through the targeted analysis of student demographic and performance data” (p. 2). It is said, that which was unrecognizable before, now “become that much more visible, with their various markers sampled, collected, evaluated, and replayed in a legible form” (Larusson & White, 2014, p. 2). Learning analytics might be operationalized via the digital
architectures of video games, online work, or intelligent tutoring systems. In intelligent tutoring systems, software systems form models of learners and adapt the learning environment based on learner performance, purportedly in much of the ways a human tutor would.

Methods of learning analytics are able to estimate not just knowledge or effectiveness of a pedagogical strategy but also student engagement in order to inform and identify whom and when potential necessary interventions are needed. Thus, learning analytics are purported to be the ideal data-assisted approach to inform the individualized needs for enhancing teaching and learning. These approaches then have direct implications for equity based on who and what educational interventions are made and, as such, what students are more subject to biopolitical regimes of control.

Although promising, learning analytics are not without their shortcomings, especially as a force of regenerative capacities. By using a host of algorithms, including clustering algorithms of unsupervised learning, learning analytics are functioning as a generative force for the transactions of teaching and learning. While this process is assumed to be data-driven, what’s overlooked are the values built into the properties of the algorithms and the resulting groupings and decisions. As Perrota and Williamson (2016) argue

“‘epistemic politics’ are not second-order phenomena that emerge from the human usage of algorithms, but are the result of these machines’ very own operational properties, which endow them with distinct performative power. This is to say that, in the specific case of clustering algorithms [in learning analytics], patterns are not just ‘found’ but, at the same time, actively constituted. The entanglement of finding and making is in fact observable at the level of the mathematical formalisations, which describe the operations that attempt to create clusters in a data set” (p. 8).
These mathematical formalisations refer specifically to how a solution is reached and the ways in which there are always multiple solutions. Whether by way of rotation, who’s included, and what features (variables) are included, the solution will vary. Moreover, as Perrota and Williamson (2016) point out, the algorithm takes the local optimum solution (a solution that is optimal relative to several others), not the global optimal solution (a solution that is optimal to all other possible alternatives). The known implication of this is that the estimated clusters can vary, making them constituted based on these mathematical formalisations and not necessarily capturing something inherent to the data. As estimates of ‘objective truth’, the clusters are then treated as capturing some essential characteristics about the subjects of the clusters. The danger of such essentialist interpretations are that “analysts run the risk of crystallizing knowledge about those groups” (Perrota & Williamson, 2016) and performatively enacting teachers and students to act and do accordingly. As in other data, the measured transactions of the cluster analysis, the resulting solution, and the performatively enacted transactions of teaching and learning would all be demarcated and delineated on raced, gendered, and classed configurations. These forms of algorithmic acts that are iteratively embedded in the digital architectures of learning analytics platforms cloak the regenerating of the capacities of particular bodies.

As a way to account for the mutual constitution of the study of biopolitical technologies and regenerative capacities with my being, I’d like to reinsert myself into the entanglement of the phenomenon and discuss how it has affected me as the mutually constituted observer and human researcher. While I have often thought of the greater facility of learning analytics to inform the transactions of teaching and learning than the static measurement of standardized testing, this analysis has heightened my concern for the greater potential for the managing, shaping, and surveilling of socially demarcated bodies via learning analytics. Arguably, this is the future of
education and society and the unknowing modulating mechanisms of new eugenics practices is profoundly concerning. Working through the more-than-human performative acts of the sociotechnical assemblages of learning analytics, the new eugenics become an agential phenomenon that is forming and shaping the student and future citizens. This analysis illuminates the racializing assemblages of the new eugenics entangled in each of these examples of biopolitical technologies that are and will increasingly be shaping my/our futures.

Beyond these important new materialists interventions, biopolitical technologies do function -- they do identify, scale, and predict – thus, we have to reconsider what makes these technologies effective. How can we make sense of the functionality of technologies of measurement that seek to freeze a world in motion? As I have argued elsewhere (Dixon-Román, 2017), measurement is an event and performative process of intra-actions that materially reconfigures determinate boundaries within phenomena, designating what matters and doesn’t matter and what’s possible and impossible. In the intra-actively reconfigured boundaries includes the demarcated emergence of assemblages of race, gender, class, sexuality, and disability. “Cultural laws of positioning and ideology”, Massumi states, “are accurate in a certain sphere (where the tendency to arrest dominates). … The issue is to demarcate their sphere of applicability—when the “ground” upon which they operate is continuously moving” (p. 7). Biopolitical technologies function because in sociopolitical systems of hierarchizing and differentiating bodies there is a tendency to arrest in order to maintain orders of power relations through the performative force of the metrics. The design and architecture of biopolitical technologies reflects the dominant values, interests, ways of knowing, and ways of being. This enables technologies of quantification in education to identify, scale, and generatively predict precisely because of their applicability toward the aims of surveilling and controlling,
demarcating and delineating the regenerative capacities of bodies.

**Conclusion**

New materialisms open up new possibilities for rethinking the effectiveness of biopolitical technologies in education policy. We see this most prominently with technologies of quantification and the ways in which they are employed in education policy. By arresting the movement and flow of the body, psychometric measures of testing, administrative data analytics, and learning analytics are used to manage, shape, and control the capacities of bodies in space and time in order to regenerate orders of power relations.

While the interpellative identities and positions that inform social reproduction theories have been helpful for the materialist analysis of power relations they have missed the important movement and process of the body and social change. Here, I have argued for a shift toward new materialist analysis on regenerative capacities and the biopolitical technologies that serve as regulating mechanisms of generativity in control societies. This might be by way of the study of physiological processes in association with classroom processes, testing administrations, home/family life and practices, and ongoing social events and situations in the community. With the advances in handheld technologies one also now has the capacity to measure various physiological processes through time and space in order to analyze how the matter of the body is mattering and better understand bodily mattering in relationship with biopolitical technologies of quantification. With the rise of computational psychometrics, administrative data analytics, and learning analytics, the assemblages of education policy are increasingly becoming social architectures of the generative forces of control societies.

Generative force, or generation, can be better understood as onto-epistemological movement and process of matter, materiality, and the body. New materialisms help us to rethink
the ontology of matter, materiality, and the body in order to consider the regenerative forces of
the body. The new materialist lens not only deconstructs the Cartesian split and nature/culture
binary that has undergirded philosophical thought and social science theories and methods but
brings theoretical focus back to the bodily capacities to regenerate. The computational turn has
brought about new technologies and practices of managing and controlling bodies, and arresting
and sedimenting sociopolitical relations of hierarchization and differentiation. Emerging from
these arrested and sedimented sociopolitical relations are assemblages of race, gender, class,
sexuality, and disability. As that which is increasingly informing pedagogical interventions, the
unseen and unknown modulating mechanisms of biopolitical technologies in education are
constraining equitable possibilities. Arguably, it is through the employment and performative
force of biopolitical technologies in education policy that enables the surveilling, managing, and
demarcating of regenerative capacities that constrain the movement, process, and potentialities
for/of social change. Yet, in addition to enabling biopolitical regimes of control, the
computational turn also brings about new possibilities of analyzing, understanding, and
disrupting processes of biopolitics. It is this brave turn that critical scholars of education must
take in order to generate new futures of educational equity and social change.
References


