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Metaphors we're colonised by? The case of data-driven educational technologies in Brazil

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Metaphors we're colonised by? The case of data-driven technologies in Brazil

This article discusses issues concerning the dissemination of data-driven educational technologies in Brazil. Here, as elsewhere, Educational Technology continues to be optimistically peddled as the bearer of a panacea for historically-rooted social problems. Whilst some of these technologies have indeed contributed to important widening-participation programmes in the last two decades, widespread advocacy of technological 'solutionism', reflected in gradually stronger policy demands for efficiencies to be improved through 'innovation', has supported a relentless marketisation of the country's educational systems. As transnational corporations surreptitiously position themselves to take control of key areas of these systems, threatening to restructure the whole sector, data-driven educational technologies provide the latest example in a series of 'new' ideas offered in an ever-expanding market. Based on the notion of 'conceptual metaphors', which encapsulate specific ways of perceiving, thinking and relating with the world, this article examines key metaphors underpinning discourses surrounding data-driven educational technologies in Brazil. In particular, the article analyses ways in which these specific metaphors may be promoting perspectives that ignore difference and obscure broader questions concerning education, thus contributing to the reproduction of previously existing problems and supporting new forms of colonisation.

Keywords: educational technology; data-driven educational technologies; Big Data; conceptual metaphors; critique; Brazil

Introduction

As the writing of this article began (May 2018), financial media across the world announced yet another significant change in the Brazilian educational landscape: Kroton (one of the leading privately-owned Higher Education Institutions operating in the country) acquired Somos, self-described as the 'largest compulsory education group in Brazil' (G1 2018; Mello 2018). This came a little while after a proposed merger by Kroton with Estácio (another large conglomerate of HEI that spans practically the country's entire territory) was vetoed by CADE, the local business regulatory agency (Martelo 2018). Assuming that CADE's approval for the latest merger is passed, then Kroton (currently involved in excess of 75% of the country's HE student cohort - INEP 2017) will enter compulsory education through Somos' *mix* of school brands and franchises, publishers and educational technology companies. Indeed, Kroton is already promising further acquisitions of small school-related businesses in what is viewed as a new yet auspicious sector for further company expansion.

For international 'edu-business' actors, Brazil constitutes an emergent and important market. Despite the serious economic crisis it has been experiencing since 2015, the country remains positioned amongst the ten largest world economies (IPRI

2017) and presents great market potential. In 2016 private providers of compulsory education hosted 18.4% of the 48.8 million school student cohort (INEP 2016). Figures pertaining to HE (public and private) are equally extensive: in total, 8 million students were enrolled in 2016, indicating a staggering 62.8% increase in numbers from 2006. Indeed, in the last two decades the country has witnessed a significant expansion of its private (including for-profit) education sector. Crucially, digital technologies are gradually supporting the private sector to position itself, mostly surreptitiously, at the core of Brazilian public education systems, as elsewhere (Selwyn 2016), with data-driven educational technologies – e.g. adaptive learning and personalised learning systems – occupying centre-stage in the most recent marketing and media discourses.

Issues related to the collection and storage of large volumes of data by GAFA[1] companies (Lindh and Nolin 2017) have recently begun to attract the attention of Brazilian academic commentators (e.g. Amadeu 2017; Rosa and Chevitarese 2017; Nascimento 2016) as well as local news media. The expression *Big Data*, specifically, started to appear around 2013, with 53 articles on the subject published by the end of 2017 in *O Globo*, the second largest Brazilian newspaper. This level of attention contrasts with the development of a 'digital society' in Brazil. Whilst the country has more mobile lines (phones and tablets) than its total number of inhabitants (Anatel 2017), only 57.8% of households were connected to the Internet in 2015 (Santos 2018), and 156 million of the 241 million total mobile connections at this time were prepaid, which may suggest use predominantly by lower-income classes (Anatel 2017). Brazilians constitute the fourth largest group of Internet users[2] and the 4th largest group of Facebook users[3] but, paradoxically, the presence of computer-based technology in classrooms remains inconsistent and differs significantly between public and private schools. In 2016 computers were present in little over 50% of public-school classrooms, whilst the proportion in private schools exceeded 80% (CETIC 2017, 97). Mobile devices are generally shunned by teachers, in part due to poor Wi-Fi infrastructure (CETIC 2017, 107) but also due to lack of teacher training for their use.

IT infrastructure development has been a concern in Brazil since the 1980s, when public policy aimed at expanding the country's technological basis began to be consistently enacted, albeit opening ample space for more intense public-private partnering and, in particular, for private enterprise to provide 'solutions' for 'educational problems.' Local discussions regarding the presence of digital technologies in education, however, tend to be strongly polarised (Rosado, Ferreira, and Carvalho 2017). On the one hand, optimistic and solutionist (Morozov 2013) perspectives characterise not only marketing, institutional and commonsensical discourses but also a significant proportion of the literature produced academically. On the other hand,

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1 Google, Apple, Facebook and Amazon. Kwet (2019) adds Microsoft to this list (GAFAM).

2 c.f. https://www.internetworldstats.com/top20.htm (22 July 2018)

3 c.f. https://www.statista.com/statistics/268136/top-15-countries-based-on-number-of-facebook-users/ (22 July 2018)

criticism of the affordances of digital technologies in education have tended to focus primarily on locally practiced models of Distance Education (DE). Here, a vast academic literature has heavily criticised DE as a dehumanising profit-making enterprise devoid of quality and concern for issues of citizenship and national development. Such criticisms persist, despite the success of the Open University of Brazil, one of the most significant ways in which technologies have been used to widen participation in HE nationally.

This article, thus, considers how a new generation of digital technology 'solutions' is being introduced in a scenario of relentless marketisation and serious threats to public education. In Brazil, with the support of contested but favourable policy conditions, international actors (companies, multilateral agencies and Non-Governmental Organisations) are able to search for new spaces to operate, constituting new markets and data sources. Although purchases and deployment of different forms of imported IT systems have been taking place here for decades, the increasing uptake (in education and other sectors) of services effectively hosted *abroad* opens new avenues for questioning, as local processes are situated within the broader context of unprecedented global surveillance and business that exploit datafication. Whilst important questions are being tackled by a rapidly growing literature on this subject, issues that are specific to developing countries, however, have only recently begun to be raised (e.g. Milan and Treré 2017).

In this context, assuming that 'critique is essentially making visible the interconnectedness of things' (Wodak and Meyer 2009, 7), this article offers a critical perspective on what is being claimed in Brazil about data-driven educational technologies. The discussion focuses on the use of metaphorical language, analysing, in particular, three conceptual metaphors of 'Big Data'. The idea of Big Data is a fundamental notion supporting data-driven technologies and offers a ready basis for claims of the potential of Artificial Intelligence (AI) techniques frequently embedded in such technologies. The article takes the approach that conceptual metaphors encapsulate specific ways of perceiving, thinking and relating with the world, and therefore they may be understood as 'self-fulfilling prophecies' (Lakoff and Johnson 1980, 156). In this sense, conceptual metaphors constitute key persuasive devices. Based upon a metaphor analysis of a corpus of texts selected from openly available institutional, media and marketing sources, the article explores ways in which these metaphors may be promoting perspectives that ignore difference and obscure broader questions concerning Brazilian education, thus contributing to the reproduction of previously existing problems.

Metaphors, Big Data and Bigger Pictures

In opposition to a long tradition in the history of Western thought particularly strengthened by philosophers such as Hobbes and Locke, the twentieth century witnessed a reinstatement of the cognitive role of metaphors. They are no longer conceived as mere ornaments or unwanted embellishments, a position condensed by Black (1962, 25) in an ironic 'commandment': 'Thou shalt not commit metaphor'.

Contrary to this view, an interactional perspective on metaphors (Richards [1936] 1964) implies their conceptualization as a fundamental meaning-making device. Metaphors are 'condensed analogies', according to Perelman and Olbrechts-Tyteca ([1969] 2008, 670), i.e. they convey qualifications and value judgements more economically and subtly, thus constituting powerful argumentative resources.

In short, from a cognitive perspective, it can be argued that we live by metaphors. Channelling our perceptions, metaphors can be said to constitute us. What we call real is no more than a diminished range of particles, colours and sounds we capture with our senses. On this basis, diverse societies create different cultural filters that direct our gaze and model the real into a fabricated reality, i.e. a cultural construct. Amongst these social lenses, metaphors play an important, albeit discrete role. With recurrent use, they are demetaphorised and their use is normalised. In short, metaphors act to frame the world: they describe it but, in so doing, *configure* it in different ways, shedding light on some aspects whilst obscuring others.

Thus, it commonly eludes us that many words and expressions are, indeed, metaphors associated with what Lakoff and Johnson (1980) describe as more general 'conceptual metaphors'. Consider, for example, how expressions we commonly use to refer to discussions relate to an underlying metaphor of discussion as 'war' – for example, 'your strategy is indefensible'; 'your criticism was on target'; 'I'll never win an argument with him'.[4] Conceptual metaphors impose a *package*, a set of conclusions, value judgements and predispositions towards approaching matters in specific ways.

Lakoff and Johnson (1980, 156) suggest that 'metaphors may create realities for us, especially social realities. A metaphor may thus be a guide for future action. Such actions, of course, fit the metaphor. This will, in turn, reinforce the power of the metaphor to make experience coherent.' In talk about educational issues, several widely-known metaphors cast knowledge, if not education itself, as 'content' that is 'packaged', 'transferred' and 'delivered'. Consistently with Reddy's (1993) conduit metaphor of communication,[5] which 'objectifies meaning in a misleading and dehumanizing fashion' (Reddy 1993, 186) by suggesting it is 'contained in' and 'conveyed by' words, metaphors such as Comenius' ([1657] 1907) teaching as 'printing' and Freire's ([1970] 2005) 'banking education' objectify, albeit in different ways, the processes and the subjects of education. As Charteris-Black (2004, 29) suggests, 'metaphors that have become conventionalised (...) constitute verbal evidence for an underlying system of ideas - or ideology'. Hence, metaphor choice can be seen as a persuasive and profoundly political act, as Freire's ([1970] 2005) critique clearly indicates.

This perspective brings to the fore the profound significance of metaphors of Big Data, since they both reveal and conceal important aspects entailed in the creation and circulation of ideas on the subject. In particular, conceptual metaphors have

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4 The same conceptual metaphor is expressed in Portuguese.

5 Also relevant in Portuguese.

broader, yet vital political implications. Metaphors that cast data as 'natural occurrences' (Awati and Buckingham-Shum 2015; Lupton 2015; Puschmann and Burgess 2014), specifically, support their conception as an unproblematic *given*, an idea embedded in the etymology of the word [6] and intrinsic to a lot that is said about Big Data. However, as Couldry and Yu (2018) point out, this idea obscures critical ethical questions pertaining to freedom, autonomy and privacy. Indeed, the unparalleled surveillance enabled by ever more powerful datafication techniques has been discussed as a key element supporting not only a new form of capitalism (Zuboff 2019) but also (and crucially to the analysis presented in this article) new forms of colonialism (Thatcher, O'Sullivan, and Mahmoudi 2016; Couldry and Mejias 2018; Kwet 2019).

Methodology

The remainder of this paper applies these notions to making sense of the ongoing discursive construction of (big) data-based education in Brazil, exploring the subtle ways in which conceptual metaphors act as condensed analogies to make complex phenomena familiar, albeit in biased and simplified ways. This is not as straightforward as might be imagined. Indeed, metaphors are polysemic and subjective, i.e. they are not universally shared. Hence, identifying linguistic expressions as metaphors is not a trivial task, as it depends significantly on contextual specificities of their production, dissemination and interpretation. Also, as not every metaphorical expression corresponds to a conceptual metaphor, identification issues can be assumedly resolved with recourse to corpus linguistics approaches (Charteris-Black 2004). This article, however, draws upon a rather more focused analysed, as described below.

i) Corpus construction and metaphor identification

The corpus was constituted with texts selected from the open site *Porvir*[7], launched in 2011 to 'inspire innovation in entrepreneurial initiatives, public policy, programmes and investments that improve the quality of education in Brazil.' The site is sponsored by the Inspirare Institute[8], a privately-owned company that supports innovation in Education. Site materials supposedly represent a 'new conception of education' entitled 'Innovative Integral Education', which aims to 'promote the integral development of students, considering all of their dimensions: intellectual, emotional, cultural, physical

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6 In Portuguese, a single word is equivalent to *data* and *given*, which provides further support to metaphors that conceptualise data as things that exist 'naturally'.

7 Porvir is a possible Portuguese translation of 'future', which means, literally, 'to come' and, thus, suggests a stronger measure of fatalism than its more common alternative, *futuro*. Available at: http://porvir.org

8 http://inspirare.org.br/

and social; [and] to respond to demands of the contemporary world and specificities of the 21st-century student.' (Porvir 2018). The site's intended audience comprises educators and teachers at all levels and sectors, managers, government representatives, foundations and NGOs and 'edupreneurs', making *Porvir* a rich source for investigating ideas on educational innovation and technology peddled in the country.

Using 'Big Data' as a primary keyword and 2013 as lower limit for publication year, a site-wide search for articles was conducted in January 2018, yielding 52 results after initial filtering. The analysis was carried out both individually and in fortnightly group discussions. The first stage of the work involved identifying general themes through unfocused individual readings of the complete corpus. The material was then divided amongst group members for detailed reading and (potential) metaphor identification in respect to the following terms: data, teacher/teaching, learner/learning, student/(to) study, education, technology/technologies.[9] A frequency count on selected words was also carried out. Conceptual metaphors were identified based on grouping and categorisation of phrases agreed-upon as metaphorical expressions.

ii) General description of corpus

In general terms, the articles consist of presentations of start-ups, digital technologies, events and (few) educational actions considered 'innovative', reflecting the site's conception of 'educational innovation' simply as the *use* of digital artefacts. Most of the texts appear to have been produced from information available on company and institutional sites (e.g. World Bank Blogs) or provided by representatives of companies (e.g. Pearson, Blackboard, Knewton), universities (e.g. MIT, Harvard, Columbia) and research centres. From the 52 articles, only 13 mention Brazilian experiences or interviewees who do not figure as representatives of international organisations.

Some articles are short summaries of material originally published elsewhere (e.g. *New York Times* and the *Harvard Gazette*), and various items refer to so-called findings of the NMC Horizon Project[10]. The set includes also translations of material originally written in English by company representatives (e.g. Knewton's José Ferreira and EdSurge's Tony Wan), suggesting themselves as pieces of corporate marketing. A single article in the set selected is attributed to an educator (US-based senior management level). Essentially, then, three-quarters of the material analysed convey perspectives, opinions and information sourced in the Anglophone world. Significantly, named EdTech products and artefacts appear to be in their early phases of design or prototyping: they are mere *promises*, not actually tested products with results to be discussed and problematised.

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9 All the material extracted from the corpus included in this paper is presented in English translation.

10 https://www.nmc.org/nmc-horizon/

Table 1 shows the results obtained from the word frequency count. The terms in bold are relevant to the site as a whole. Italicised terms are more directly relevant to this article. Words between brackets have their frequencies included in the figures shown for the main term indicated.

Table 1: Frequency of selected terms in corpus (English equivalents)

Term	Frequency
Education (to educate; educator)	386
Student (to study)	361
School	267
Data	262
Teaching (to teach)	235
Teacher (tutor; mentor)	234
Technology (technologies; EdTech)	187
Brazil	149
Learning	145
Innovation (to innovate; innovative)	135
Big Data	101
Information (to inform)	96
USA (United States of America)	96
Entrepreneur (enterprise)	80
Tools	77
To personalise (personalisation)	71
Change (transform)	63
Problem	61
Product (to produce)	45
Learner (to learn)	44
Specialist	40
Solution (to solve)	35
Resource	33
Path	33
Pedagogy (pedagogical)	21
Collective	1

Socialise	1
Citizenship	0

Terms that appear more frequently are directly related with the site's core agenda, reflecting the premise that 'innovation' in education is a 'problem' to be 'solved' with the use of technological devices brought into educational settings by external initiatives and 'entrepreneurs'. In this vein, technologies are framed as 'tools', 'products' and 'resources' with the ability to 'change and transform' education. The other end of the frequencies scale, where *absences* are identified, completes the picture. The absence of words like 'citizenship' and the negligible frequency of appearance of 'socialise' and 'collective' are consistent with individualistic agendas promoted by the EdTech industry. This is further indicated by the high frequency of 'USA', which appears as the main source of systems and ideas.

Findings: Three Conceptual Metaphors of Big Data in Brazilian Portuguese

A great variety of metaphors emerged from the analysis, but three have been selected for discussion in this paper as they lend structure to much of this variety and, thus, suggest themselves as conceptual metaphors. The first metaphor discussed, BIG DATA IS A NATURAL RESOURCE, subsumes the popular idea from elsewhere in the world of 'data as the new oil'. The second metaphor, BIG DATA IS A TOOL, relates to a more general 'technology is a tool' metaphor. The third metaphor, BIG DATA IS A SUBJECT reflects the 'radical displacement' discussed by Barreto (2017): technology and artefacts framed not as objects, but as subjects with agency, an idea that can be identified in discourses that support automation in, essentially, all areas of human activity.

i) Big Data as a natural resource

Within the corpus, 'Big Data' appears associated with various processes applied to natural resources: 'raw' data is 'captured', 'collected', 'obtained', 'retrieved' and 'extracted', prior to being 'treated' and 'processed' in operations such as 'grouping', 'cross-referencing' and, interestingly, 'welding'. Eventually, data is 'transferred', 'stored' and 'exploited', 'deposited' in 'databases' or 'databanks'. These findings are consistent with the associations of Big Data with natural resources in non-educational contexts identified by Anglophone scholars.

This metaphor has been consistently criticised for obscuring the issue that data results from human-devised operations, i.e. they are not materials that exist in the physical world prior to human intervention. As Kitchin and Lauriault (2014, 4) suggest, 'databases and repositories are expressions of knowledge/power, shaping what questions can be asked, how they are asked, how they are answered (...)'. The metaphor conceals that choices and conventions drive science and technology, supporting their view as objective and value-free enterprises. The excerpt below is telling in this respect:

> '[Big Data provide] a complete X-ray of what is assimilated by students.'

In equating Big Data collection with X-ray imaging, the extract suggests an organic, 'natural' relationship between a *representation* and *what is represented*. It is interesting that the relationship proposed is not with a photograph: X-rays supposedly shed light on inner workings that are invisible to the naked eye, whilst photographs assumedly capture what presents itself *directly* to vision. Obviously, neither photographs nor X-rays are neutral: both entail various levels of representation and, therefore, are open to interpretation. The extract also articulates another key metaphor: learning as 'assimilation'. This is reminiscent of the printing and banking education metaphors mentioned above, suggesting a conceptual metaphor related to the idea of 'filling a container', which is also consistent with the metaphor of learning as 'absorption' associated with the 'cerebral subject' that construes the human as a brain (Vidal and Ortega 2017). Whether the learner is conceived as a blank sheet, an empty vase or a computational *tabula rasa*, it appears that all these metaphors assume there is no interpretation involved in any of the processes is question.

ii) Big Data as a tool

The metaphor of technology as a tool is another common facet of how the IT industry has long promoted itself as capable of realising the 'transformation' and 'improvement' that education is claimed to require. In this context, data-driven technologies can be viewed as the latest entry in a long list. As such, they are 'likely to reproduce, perpetuate, strengthen and deepen existing patterns of social relations and structures – albeit in different forms', as Selwyn (2013) suggested in respect to other forms of digital devices.

Within our examined corpus, the metaphor condenses the insidious idea that technological artefacts are *neutral*, promoting an uncritical perspective that obscures fundamental questions concerning products of an industry primarily moved by commercial interests (Ferreira and Lemgruber 2018). Tools have a *what-for* – they materialise specific design purposes (Ferreira and Lemgruber 2018) – and claims surrounding Big Data as an educational tool suggest there is a profound, consensual and widely-shared understanding of learning processes, as illustrated with the following excerpts:

> 'With Big Data, it's possible to guarantee student learning, since it's possible to measure and observe if they are learning or not, how their learning is and how they are evolving.'

> '[Two developers] got together to build a technological tool that uses data analysis and prediction as a way to decrease evasion and bring parents and guardians closer to the school routine of children and adolescents.'

The second extract above is a clear example of a solutionist perspective on potentially complex social issues. It is noteworthy that, from the 52 articles analysed,

only two list possible data categories, which include a mix of 'location', 'behaviour', 'academic record', 'performance assessment', 'attendance' and 'interests'. However, these categories are relatively meaningless given the lack of clarity concerning models underlying data collection. This highlights the ways in which such a metaphor supports various premises. In addition to the notion that education is *broken* (*bankrupt*, in the Brazilian equivalent), teachers are anachronistic characters, out-of-touch with practices of the assumedly digital world of today, and technological artefacts will *solve* these problems. These premises compose a backdrop for most of the articles analysed, which fallaciously present a complex scenario as an impoverished straw man, as illustrated below:

> 'Most of the time, students are encouraged to remember facts and dates, following a standard procedure. The maths class requires the correct application of a formula, whilst in history what is required is the citation of dates and places.'

> 'With the help of algorithms (...) you will stop judging the student on the basis of their performance in a single day. This would make sense in a world of paper where data circulation was difficult.'

> 'Although technology is able to capture diverse and *precise* data that capture students' performance, the Stanford researcher says that analysis requires *clear* theories.'

The first extract highlights pedagogical practices that have long been criticised by specialists, whilst the second raises assessment-related issues that have little to do with the current positioning of digital technologies as the *epicentre* of radical changes and historical *discontinuity*. These misleading portraits of pedagogy and assessment, however, invariably support discourses that confer salvationist powers to technology. Since no actual critique of pedagogical issues is offered, nor any real discussion of alternatives is developed, adjectives are used to fill the resulting conceptual void, as the third extract above illustrates with the qualification of data as *precise* and theories as *clear*. Assumedly the 'Stanford researcher' has their own methodological preferences but, by not mentioning them in the article, its author seeks to establish a prior understanding with the reader that such 'clear theories' exist. As a premise, the claim requires no explanation, particularly as the underlying assumption is that, given we are a faced with an anachronic education, constant novelty and updating are needed: *new* methodologies, *new* modes of assessment, *new* teacher, *new* technologies, *new* tools. Adjectivation suffices to support these ideas by underpinning them with a positive value judgement brought to light by another conceptual metaphor: NEW IS UP.

If education requires an *upgrade*, this will be assumedly achieved by 'resorting to best practices already established in other sectors' (New 2016, 1). The articles on *Porvir* reverberate key aspects of the Silicon Valley narrative critiqued by Weller (2015, 3): 'that a technological fix is both possible and in existence (...) that external forces will change, or disrupt, an existing sector (...) [and] wholesale revolution is required; lastly that the solution is provided by commerce'. Despite problems highlighted by

research into educational reforms led by businesses in the USA (Ravitch 2011), Brazilian policy has been incorporating the same ideas, which not only demoralise teachers and deskill their profession but also contribute to dismantle the local public education system (Freitas 2012). These ideas echo in the sample analysed, with 75% of the texts directly reproducing opinions produced abroad but all of them clearly representing a Silicon Valley rhetoric.

iii) Big Data as a subject

In contrast with the metaphors discussed above, here Big Data is ascribed the status of a *self-motivated agent* rather than recipient of external actions. Various ontological metaphors, which cast events, activities, emotions and ideas as entities and substances (Lakoff and Johnson 1980), were identified in the corpus. Generally, they suggest that Big Data, whilst coldly stored in hard drives, becomes a powerful entity endowed with its own motivations as well as abilities to decide and act. Data 'help', 'support', 'provide foundations', 'facilitate', i.e. embody a *guide* that 'measures', 'predicts' and 'encourages behaviours.' Some claims associated with the potential of Big Data and Learning Analytics border the mythological: these things, together with AI, are equated with powerful precognisant beings, *soothsayers* who can foretell the future on the basis of what they *learned* in the past. Data-driven AI becomes a superhuman entity with 'predictive' abilities due to an assumed capacity to process and *find meaning* in large volumes of data.

Whilst science may be concerned with prediction, this is done on the basis of recognising *correlations*, which are *not* evidence of causation. However, the hype surrounding Big Data is infused with the idea that causation has become irrelevant and theory is no longer required (Anderson 2008). A more sensible approach might ponder that identifying causal relationships may be essential, albeit in the guise of 'counterfactual reasoning - asking "what if?" (...); and no amount of data or brute computing power can replace this' (Barrowman 2014, n.p.). Yet, in the scenario of a brave new (data-driven) education, 'pedagogy is being distributed to automated machines such as "teacher bots" and "cognitive tutors", responsible for conducting learning in real time' (Williamson 2017, 7). These ideas permeate the texts analysed, reflecting also the broader trend in Brazilian educational policy towards partial or total replacement of teachers by machines, as, from the prevailing *economicist* perspective, teachers are 'always the most expensive technology' (Barreto 2017, 129). The following excerpts from the corpus illustrate this:

> 'We use data mining to find models that represent the behaviour of students during a task. We use observations by humans to create models that no longer need humans, models that will detect and provide this information themselves.'

> 'Imagine AI-driven lifelong learning companions that can accompany and support individual students in their studies - at and beyond school - or new forms of assessment that measure learning, while it happens, shaping the learning experience in real time,'

These extracts frame data-driven technologies not only as subjects but, actually, as *better* subjects, since data is supposedly objective (unbiased), encompassing (omniscient) and *precise*. The idea of precision integrates a discursive fabric that suggests Big Data knows us better than we do ourselves. In juxtaposition to such perfection, humans emerge as savages in a scenario that is strongly reminiscent of Huxley's dystopia. However, what remains concealed are the human choices effectively made at the backstage of data-driven 'personalised' systems: teachers are not necessarily replaced entirely by machines but by systems that also involve decision-making and actions by entrepreneurs and developers, as Bannell (2017) pointed out. Indeed, within the corpus, arguments from authority[11] abound that appeal to businessmen, TV personalities, football players and Formula 1 drivers as heralds of an 'innovative' education – in Brazil, they are entitled to obtain copious amounts of public funding for their educational foundations.

Discussion: Towards New Modes of Colonisation?

These analyses need to be contextualised within the specific Brazilian scenario in which they are situated. Historically, Brazil was seen, for a long time, as an immense reserve of resources to be extracted and shipped to Europe, particularly during the rise of capitalism, and a comparable mechanism appears to be inscribed in the corpus discussed here. In this respect, it is especially significant that, in one of the articles, the country is framed as a key 'user base' of a large US-based MOOC provider, an idea presented within the globally-promoted narrative that justifies data collection for the purposes of improving 'personalisation'. This 'user base' is cast as a territory ripe for *exploitation*. Crucially, a high-ranking Brazilian university manager optimistically proposes a metaphor for the 'productive use of data' as 'turning the Cape of Torments and transforming it into the Cape of Good Hope', in an explicit reminder of the world's colonialist past. In fact, whilst data are collected locally, processing takes place elsewhere, and the sale of processed data in the shape of new systems and devices back to the source appears to complete a lucrative cycle of 'digital colonialism (…) [,] a structural form of domination exercised through the centralized ownership and control of the three core pillars of the digital ecosystem: software, hardware, and network connectivity' (Kwet 2019, 2). The resemblance between what happens in Brazil and Kwet's (2019) analysis of the South African case (and possibly other countries in the 'global South') is striking. In particular, when GAFAM companies *generously* offer technologies to disadvantaged students, data is unimpededly extracted and subsequently treated in manners that render local specificities devoid of importance.

As already mentioned, long before the expansion of the Internet and the advent of massive data collection mechanisms, standardisation was already imposed locally through imports of IT products, albeit initially in the guise of closed commercial

[11] Arguments from authority use 'the acts or opinions of a person or group of persons as a means of proof in support of a thesis' (Perelman and Tyteca-Olbechts [1969] 2008, 513)

software and hardware packages. IT imports from the US, particularly relevant to the education sector, have been supporting the appropriation of discipline-based language across areas of knowledge (with computing and management neologisms entering the educational arena) as well as languages (here, from English to Portuguese). Language appropriations across boundaries such as these often involve re-versioning metaphors (Papadoudi 2014), sometimes through free, word-by-word translations, other times through the integration of English words into the Brazilian Portuguese lexicon as neologisms, in our case. Whilst local versions of metaphors such as 'delivery of education, 'delivery of content' and 'knowledge packaging' are a relative novelty and still tend to strike Brazilians educators as strange or foreign (even in DE circles), the metaphors of Big Data identified in our analysis appear to be on their way towards being *absorbed* here with little dispute, at least so far. However, if 'a borrowed metaphor is a borrowed item of culture' (Oncins-Martínez 2014, 149), the need is clear for critically approaching metaphors such as those discussed in our findings: since these metaphors specifically encapsulate apolitical perspectives, it is essential to question the processes surrounding their appropriation.

The colonisation of educational institutions by management-originated language, in particular, critiqued by Fairclough (2010) in respect to the UK, has been taking place in Brazil to such an extent that Barreto (2017, 134) was able to argue that Brazilian Education 'itself dislocated to the territory governed by a business rationale'. Local discourses on education have become gradually more closely aligned with market-oriented rhetoric, constituting a point of contestation and debate amongst stakeholders involved in educational policy formulation. As suggested above, big companies now appear to be shifting their interest towards compulsory education, as their hold of HE is practically consolidated, at least in numbers. This takeover appears to have marked the development of the latest *National Common Curricular Basis* (NCCB) (Brazil 2018), originally entrusted to a group of specialists including teachers, academics and civil society associations, but gradually transferred to representatives of private interest groups (ANPEd 2017). A mapping of individuals and groups that led another key educational reform (Peroni 2018) revealed the dominance of various organisations that both support *Porvir* and (perhaps unsurprisingly) created the NCCB. These business-led reforms were enacted at the level of central government, but similar trends can also be identified across the State hierarchy.[12]

Porvir is connected to private organisations that have penetrated key sites of educational policy formulation, where reforms are invariably proposed on solutionist bases. Therefore, it is somewhat predictable that the site, which emerges as a window of EdTech products and neoliberal ideas, promotes entrepreneurship and private initiative as the sources of 'solutions' for the problems facing education. *Porvir* disseminates strongly individualistic discourses, defending performance measurement and self-management mechanisms for the individual-*cum*-business. The allure, to managers, of the ideas and 'tools' promoted by the site resides in the possibility of *control*: although

12 Despite strong centralisation, Brazil is, technically, a republican federation.

what is effectively captured and processed is unclear, control takes the guise of personal rewards to be reaped as the individual adapts, competes and *wins*. The slogan 'education for employability' eclipses others such as 'education for life' or 'education for citizenship'. In disseminating discourses that pay little attention to pedagogy and stress individualism, *Porvir* positions the resourceful, self-reliant and independent individual as the *client* of an education *reduced* to learning (Biesta 2005).

This neoliberal conception of the 21st-century student (and, more broadly, the worker as a 'lifelong learner') is obviously familiar to non-Brazilian readers. The issue at stake here, however, is that, given the blatant inequalities of material conditions as well as cultural diversity across the globe (critical aspects of a territorially-vast country such as Brazil), it is difficult to imagine that 'North-South, East-West divisions no longer matter in the same way' (Couldry and Mejias 2018). Whilst the new logic of surveillance capitalism examined by Zuboff (2019) positions users not as clients but as *sources* of the surplus behavioural data upon which value is created, it is not clear how that this new regime will be able to manage the potential effects of cultural and material aspects involved in the lives actually *lived* by *people*. For one, existing geopolitical structures that guarantee sourcing of cheap raw materials and labour required for hardware production may turn out irreconcilable with the push towards a globalised 'data subject' strongly constructed as a *consumer* of costly goods circulated worldwide. In spite of the idea of neutrality that permeates many of the key metaphors of Big Data, social, political, and economic interests are profoundly embedded in datafication processes (Thatcher, Sullivan and Mahmoudi 2016, 995). Given these biases, it is reasonable to speculate that, in unprivileged locations (usually contexts that most sorely need efforts directed at developing different forms of data literacy - Pinto 2018), 'datafied' educational systems may specialise in creating subjects that will merely support previously existing power relationships and their associated material arrangements.

In this respect, it is significant that the metaphors of liquidity often highlighted by Anglophone researchers were not identified in the corpus examined in this paper.[13] In an analysis of how Big Data is discursively constructed in Anglophone outlets, Lupton (2015, 107) highlights the prevalence of expressions related to water – e.g. 'streams, flows, leaks, rivers, oceans, seas, fire hoses and even floods, deluges and tsunamis of data' – that encapsulate ideas such as 'vastness, unpredictability and difficulty of control and containment' (Lupton 2015, 107). These images reflect, according to Sutherland (2013), an 'ontologization of liquidity' identified in recent theorisation in the social sciences (e.g. Bauman 2000; Castells 1999). Crucially, they are justified as pointing to wider concerns with excesses and the lack of control of covert surveillance and massive data collection, as Lupton (2015) suggested. The absence of liquidity-related metaphors from a representative corpus such as the articles

[13] The 'data is the new oil' metaphor, however, does circulate widely in management media outlets based in this country (e.g. Época 2018; Loureiro 2018).

analysed here suggests that, in peripheral locations, liquidity-pertaining issues may be secondary, since the 'tsunamis', 'oceans' and 'big waves' of data *hit other shores*, as Big Data is stored and processed *elsewhere*. In this light, despite its stated commitment to education, *Porvir* emerges as an industry showcase that sheds no light on questions related to *costs*, *finances* and their *flows*, perhaps strategically. However, it is certainly not the case that local subjects need not concern themselves with such matters.

Questions such as 'who owns data?' and 'who profits from it?', therefore, urgently need to be asked. But they need to be asked and answered in the light of contextual *specificities*. Indeed, arguing that 'Big Data is shaping up to be one of the key battlefields of our era, incorporating many of the issues civil society activists worldwide have been working on for decades', Taylor, Cowls, Schroeder, and Meyer (2014, 438) called for local civil societies to engage in Big Data discussions. Such voices are obviously not discernible in the discourses represented in *Porvir*: local initiatives, at least in the sample selected, are few and outshined by the more numerous and colourful foreign proposals. Unfortunately, the predominance of imported ideas and devices is consistent with an easily seduced and exploitable local imaginary marred by a FOREIGN IS UP conceptual metaphor.

In Brazil (and elsewhere), digital technologies continue to be peddled as a panacea for historically-rooted social problems. These remain within the remit of a government(s) that is (are), overall, ill-equipped to resist the movement towards deterritorialization and deregulation imposed by large US-based multinational corporations. In this context, it is vital to contest the *multifaceted neutrality* implied by metaphors such as the ones we discussed above. Although our findings as well as Couldry and Yu's (2018) recent 'deconstruction' consistently suggest this neutrality is an unfounded myth, those metaphors constitute a powerful means to maintaining local issues out of view. From this perspective, all that might seem to be left is an invitation to conform with an inevitable 'innovative' future that will only reproduce the past, albeit in a different guise.

Closing Remarks

Between the initial submission of this article and the preparation of its final version (February 2019), the acquisition of Somos by Kroton was (unfortunately, if we may say so) approved by CADE. More importantly, a convoluted presidential campaign paved the way for the election of a controversial figure known to his supporters as 'The Myth' and to the rest of the world as 'The Trump of the Tropics'.[14] A volatile situation now

[14] Prior to the election day, evidence was uncovered that pointed to the strategic dissemination of fake news via WhatsApp, the most popular messaging service in Brazil, as well as support from USarian alt-right (also) through the possible involvement of Cambridge Analytica's Steve Bannon as campaign advisor (https://www.theguardian.com/world/2018/oct/18/brazil-jair-bolsonaro-whatsapp-fake-

unfolds in Brazil, as neo-Pentecostal fundamentalists, military personnel and, crucially, representatives of powerful economic forces have been brought together to compose a government in obvious internal turmoil.[15] In fact, it is yet to be confirmed if all of the current actors will remain in the scene for much longer.[16]

However, a (possibly) stable aspect of this new government is its aggressively neoliberal economic agenda. Indeed, Brazilian academics generally agree that public education is bound to endure more blows in the shape of funding cuts coupled with further legislation that unashamedly favours private enterprise. Some commentators have even suggested that Brazil may yet provide the stage for the most extreme neoliberal experiment in history. Ominously, the latest local announcements on educational matters suggest no radical change of direction as far as this ideological basis is concerned. On the contrary: they point to measures that are consistent with the trend towards marketisation and privatisation of the sector described in this article's introduction, which should support further expansion of technology-mediated modes of education. Ideas currently under consideration[17] would surely benefit 'edu-businesses' that supply technologies (from textbooks to 'edu-games' and VLEs), distance learning (also in compulsory education) and, conceivably, entirely *uberised* teaching services.

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news-campaign). For comments in English published soon after the election results were announced, see https://www.theguardian.com/commentisfree/2018/oct/29/brazil-election-far-right-democracy-social-media.

[15] For comments in English by a Brazilian journalist, see https://www.theguardian.com/commentisfree/2019/jan/10/jair-bolsonaro-brazil-minorities-rainforest.

[16] In particular, public rejection has been consistently voiced in respect to: the ultra-conservative (Colombian naturalised Brazilian) Minister of Education, the conspiracy-theory believer Minister of Foreign Affairs and, last but not least, the neo-Pentecostal female preacher chosen for the controversial new Ministry of Families, Women and Human Rights, referred to, in some quarters, as 'Aunt Lydia', in an allusion to Margaret Atwood's dystopian novel *The Handmaid's Tale*. For an overview of some of the pertaining issues here, see https://medium.com/@lioliveiraz/would-be-brazilian-politics-a-satire-of-house-of-cards-1bdd7d7f6094.

[17] The latest proposals include: legalising DE models at all levels (including compulsory education and post-graduate studies, previously excluded), legalising home-schooling (currently unconstitutional), implementing a system of educational vouchers (as replacement to other forms of funding), and promoting grassroots conservative movements such as 'School without Party' (an extreme-right initiative based on the absurd notion that 'ideology' can and must be 'eradicated' from educational contexts – Giorgi, Daher, Vargens and Melo 2018).

Although it would be unwise to make too many predictions at this point, as decisions have been announced only to be quickly dismissed either as fake news, groundless rumours or inappropriately 'leaked' possibilities still under discussion,[18] a key role for digital technologies appears to be guaranteed. In particular, if home-schooling is legalised and DE is permitted at all levels of compulsory education, the country should witness a significant expansion in the market for all sorts of data-driven educational technologies. The trend should continue towards 'fixing' Brazilian education through technology in a context where educators must assume the role of entrepreneurs and promote 'innovative' actions with new digital tools created, predominantly, by companies based in the global North. It is necessary to question the assumption that teachers generally accept and *will* adapt to this new order by acknowledging their 'efficiency' needs to be increased by tools that commodify their skills, a demand created by the assumed need to develop educational systems that are *fit-for-purpose* in the globalised 21st century. However, expanding conservatism is already restricting space for resistance in the context of broader societal issues. In this scenario, the issues identified in our analysis remain critical, as, with the support of powerful conceptual metaphors gradually imported into the local vernacular, Big Data may constitute the surest bet of big business as it continues poised to take over Brazilian education in ways strongly reminiscent of a parasitic *cultural invasion* (Freire [1969] 1983).

We conclude, however, with an attempt at a more optimistic reflection. In nature, potentially destructive parasitism is not the only observable type of relationship between organisms: highly productive types of symbiosis exist that are essential for maintaining the balance amongst differentiated, yet *coexisting* ecosystems. Whilst new forms of capitalism enabled by Big Data may exacerbate old inequalities, reasserting difference and cooperation in diversity may yet play a key role in resisting a 'data colonialism' based on automated attempts to impose the specific configurations required for efficient datafication (Couldry and Mejias 2018). Indeed, if '(…) universal history is the history of various intonations of a few metaphors', as the Argentine writer Jorge Luis Borges (1999, 353) suggested, then there may be yet unknown or, perhaps, forgotten metaphors we can live by. Resistance might involve searching for them precisely in *difference*.

References

Amadeu, Sérgio. 2017. *Tudo sobre tod@s: redes digitais, privacidade e venda de dados pessoais.* Kindle ed. São Paulo: Sesc.

[18] Many Brazilians and political commentators consider this apparent 'comedy of errors' a smokescreen aimed at obfuscating potentially unpopular economic measures (see, for example, https://www.ft.com/content/1a2ba4f4-de4e-11e8-9f04-38d397e6661c).

Anderson, Chris. 2008. “The End of Theory. The Data Deluge makes the Scientific Method Obsolete." *Wired* June 2008. https://www.wired.com/2008/06/pb-theory/

ANPED. 2017. “A Associação Nacional de Pós-Graduação e Pesquisa em Educação (ANPEd) e a Base Nacional Comum Curricular (BNCC)”. http://www.anped.org.br/sites/default/files/images/a_anped_e_a_bncc_versao_final.pdf

Awati, Kailash, and Simon Buckingham-Shum. 2015. “Big Data metaphors we live by”. *Towards data science*, May 14. https://towardsdatascience.com/big-data-metaphors-we-live-by-98d3fa44ebf8

Bannell, Ralph Ings. 2017. “A double-edged sword.” In *Education and Technology: critical approaches*, edited by Giselle M. S. Ferreira, Luiz Alexandre S. Rosado, and Jaciara S. Carvalho, 52-82. Rio de Janeiro: SESES/UNESA. https://ticpe.files.wordpress.com/2017/04/ebook-ticpe-2017.pdf.

Barreto, Raquel Goulart. 2017. “Objects as subjects: the radical displacement”. In *Education and Technology: critical approaches*, edited by Giselle M. S. Ferreira, Luiz Alexandre S. Rosado, and Jaciara S. Carvalho, 124-141. Rio de Janeiro: SESES/UNESA. https://ticpe.files.wordpress.com/2017/04/ebook-ticpe-2017.pdf

Barrowman, Nick. 2014 “Correlation, Causation, and Confusion”. *The New Atlantis. Journal of Technology and Society* Summer/Fall 2014: 23-44. https://www.thenewatlantis.com/docLib/20150110_TNA43Barrowman.pdf.

Bauman, Zygmunt. 2000. *Liquid Modernity*. Cambridge: Polity.

Biesta, Gert. 2005. “Against learning. Reclaiming a language for education in an age of learning”. *Nordisk Pedagogik,* 25:54–66. https://www.ltu.se/cms_fs/1.123949!/file/Article+Biesta+against+learning.pdf.

Black, Max. 1962. *Models and Metaphors. Studies in Language and Philosophy*. Ithaca, NY: Cornell University Press.

Borges, Jorge Luis. 1999. *Selected non-fictions*. Trans. by Esther Allen, Suzanne Jill Levin, and Eliot Weinberger. New York: Penguin.

Brazil. 2018. *Base Nacional Comum Curricular (BNCC).* Brasília: Ministério da Educação e Cultura. http://basenacionalcomum.mec.gov.br/

Castells, Manuel. 1999. *A sociedade em rede*. 2d ed. São Paulo: Paz e Terra.

CETIC (Centro Regional de Estudos para o Desenvolvimento da Sociedade da Informação). 2017. *Pesquisa sobre o uso das tecnologias de informação e comunicação nas escolas brasileiras: TIC educação 2016.* São Paulo: Comitê Gestor da Internet no Brasil. http://cetic.br/media/docs/publicacoes/2/TIC_EDU_2016_LivroEletronico.pdf

Charteris-Black, Jonathan. 2004. *Corpus Approaches to Critical Metaphor Analysis*. Basingstoke: Palgrave.

Comenius, Johann Amos. [1657] 1907. *The great didactic: Setting forth the whole art of teaching all things to all men.* London: Adam and Charles Black. https://archive.org/details/cu31924031053709

Couldry, Nick, and Jun Yu. 2018. “Deconstructing datafication’s brave new world’. *New Media & Society*, 20(12): 4473-4491.

Couldry, Nick, and Ulises A. Mejias. 2018. “Data colonialism: rethinking Big Data’s relation to the contemporary subject”. *Television & New Media*. https://journals.sagepub.com/doi/10.1177/1527476418796632.

Fairclough, Norman. 2010. *Critical Discourse Analysis. The Critical Study of Language*. 2nd ed. Harlow: Longman / Pearson.

Ferreira, Giselle. M. S. and Lemgruber, Márcio. S. 2018. “Tecnologias Educacionais como Ferramentas: Considerações Críticas Acerca de uma Metáfora Fundamental”. *EPAA* 26 (12): 1-16. http://dx.doi.org/10.14507/epaa.26.3864.

Freire, Paulo [1969] 1983. *Extensão ou Comunicação?* 7th ed. Rio de Janeiro: Paz e Terra.

Freire, Paulo. [1970] 2005. *Pedagogy of the Oppressed*. 30th anniversary ed. New York: Continuum.

Freitas, Luiz Carlos de. 2012. “Os reformadores empresariais da educação: da desmoralização do magistério à destruição do sistema público de educação.” *Educação e Sociedade* 33 (119): 379-404. http://dx.doi.org/10.1590/S0101-73302012000200004.

Giorgi, Maria Cristina, Daher, Del Carmem, Vargens, Dayala P. de M., and Fabyani C. Melo. 2018. “Em tempos de neocolonialismo: Escola sem partido ou Escola partida?” EPAA, 26(90): 1-20. http://dx.doi.org/10.14507/epaa.26.3512

INEP (Instituto Nacional de Pesquisas Educacionais). 2016. *Censo da Educação Superior 2016: Notas Estatísticas*. Brasília: INEP. http://download.inep.gov.br/educacao_superior/censo_superior/documentos/2016/notas_sobre_o_censo_da_educacao_superior_2016.pdf

INEP (Instituto Nacional de Pesquisas Educacionais). 2017. *Censo Escolar da Educação Básica 2016: Notas Estatísticas.* Brasília: INEP. http://download.inep.gov.br/educacao_basica/censo_escolar/notas_estatisticas/2017/notas_estatisticas_censo_escolar_da_educacao_basica_2016.pdf

IPRI (Instituto de Pesquisa de Relações Internacionais). 2017. *As 15 maiores economias do mundo*. Brasília: FUNAG. http://www.funag.gov.br/ipri/index.php/o-ipri/47-estatisticas/94-as-15-maiores-economias-do-mundo-em-pib-e-pib-ppp

Kitchin, Rob, and Tracey Lauriault. 2014. *Towards critical data studies: charting and unpacking data assemblages and their work*. The Programmable City Working Paper 2 (pre-print). http://ssrn.com/abstract=2474112

Kwet, Michael. 2019. “Digital Colonialism: US Empire and the New Imperialism in the Global South.” *Race and Class*, 1-24.

Lakoff, George, and Mark Johnson. 1980. *Metaphors we live by*. Chicago; London: University of Chicago Press.

Lindh, Maria, and Jan Michael Nolin. 2017. “GAFA speaks: metaphors in the promotion of cloud technology.” *Journal of Documentation* 73 (1): 160-180. doi https://doi.org/10.1108/JD-03-2016-0039

Lupton, Deborah. 2015. *Digital Sociology*. London: Routledge.

Milan, Stefania, and Emiliano Treré. 2017. “Big Data from the South: the beginning of a conversation we must have”. *Datactive – the politics of data according to civil society*. https://data-activism.net/2017/10/bigdatasur/.

Nascimento, Leonardo Fernandes. 2016. “A Sociologia Digital. Um desafio para o século XXI.” *Sociologias* 18 (41): 216-241. http://www.scielo.br/pdf/soc/v18n41/1517-4522-soc-18-41-00216.pdf

Morozov, Evgeny. 2013. *To save everything, click here*. London, UK: Penguin Books.

New, Joshua. 2016. *Building a Data-Driven Education System in the United States*. Washington, Brussels: Center for Data Innovation. http://www2.datainnovation.org/2016-data-driven-education.pdf

Oncins-Martínez, José L. 2014. “English idioms borrowed and reshaped: the emergence of a hybrid metaphor in Spanish”. In *Metaphor and Intercultural Communication*, edited by Andreas Musolff, Fiona MacArthur, and Giulio Pagani, 149-166. Kindle Edition. London: Bloomsbury.

Papadoudi, Dafni. 2014 “Translation of metaphor in popular technology discourse”. In *Metaphor and Intercultural Communication*, edited by Andreas Musolff, Fiona MacArthur, and Giulio Pagani, 35-52. Kindle Edition. London: Bloomsbury.

Peroni, Vera Maria Vidal. 2018. “Múltiplas formas de materialização do privado na educação básica pública no Brasil: sujeitos e conteúdo da proposta”. *Currículo sem Fronteiras*, 18 (1): 212-238. http://www.curriculosemfronteiras.org/vol18iss1articles/peroni.pdf.

Perelman, Chaïm and Olbrechts-Tyteca, Lucie. [1969] 2008. *The New Rhetoric. A Treatise on Argumentation.* Translated by John Wilkinson and Purcell Weaver. Center for the Study of Democratic Institutions. Notre Dame, Indiana: University of Notre Dame Press.

Pinto, Renata A. 2019. “Digital sovereignty or digital colonialism?’. *Internet and Democracy*, 15(27): 15-27.

Puschmann, Cornelius, and Jean Burgess. 2014. “Metaphors of Big Data.” *International Journal of Communication* 8: 1690-1709.

Ravitch, Diane. 2011. *The death and life of the great American school system*. 2nd ed. New York: Basic Books.

Reddy, Michael J. 1993. “The conduit metaphor: A case of frame conflict in our language about language.” In *Metaphor and Thought*, edited by Andrew Ortony, 164–201. Cambridge: Cambridge University Press.

Richards, Ivor Armstrong [1936] 1964. *The Philosophy of Rhetoric*. Oxford: Oxford University Press.

Rosa, Fábio Medeiros, and Leandro Chevitarese. 2017. “Vigilância e relações de poder nas redes sociais: questões éticas na sociedade contemporânea.” *Organicom* 14(27): 59-69. https://www.revistas.usp.br/organicom/article/view/144108/138780

Rosado, Luiz Alexandre da Silva; Ferreira, Giselle Martins dos Santos, and Jaciara de Sá Carvalho. 2017. “Education and Technology in online academic literature in Portuguese.” In *Education and Technology: critical approaches*, edited by Giselle M. S. Ferreira, Luiz Alexandre S. Rosado, and Jaciara S. Carvalho, 256-

299. Rio de Janeiro: Editora UNESA. https://ticpe.files.wordpress.com/2017/04/ebook-ticpe-2017.pdf

Selwyn, Neil. 2013. *Education in a Digital World. Global Perspectives on Technology and Education.* Kindle Edition. London: Routledge.

Selwyn, Neil. 2016. *Is Technology Good for Education?* Kindle Edition. Cambridge: Wiley.

Sutherland, Thomas. 2013. "Liquid metaphors and the metaphysics of flux: ontologies of flow in an age of speed and mobility." *Theory, Culture and Society* 30 (5): 3-23.

Taylor, Linnet, Josh Cowls, Ralph Schroeder, and Eric T. Meyer. "Big Data and Positive Change in the Developing World." *Policy and Internet* 6 (4): 418-444. https://doi.org/10.1002/1944-2866.POI378

Thatcher, J., David O'Sullivan, and D. Mahmoudi. 2016. "Data colonialism through accumulation by dispossession: new metaphors for daily data". *Environment and Planning D-Society and Space*, 34(6): 990-1006.

Vidal, Fernando, and Francisco Ortega. 2017. *Being Brains: Making the Cerebral Subject.* New York: Fordham University Press.

Weller, Martin. 2015. "MOOCs and the Silicon Valley Narrative." *Journal of Interactive Media in Education* 2015(1), p.Art. 5. DOI: http://doi.org/10.5334/jime.am.

Williamson, Ben. 2017. *Big data in Education: the digital future of learning, policy and practice*. London: Sage Publications Ltd.

Wodak, Ruth and Michael Meyer. 2009. "Critical Discourse Analysis: History, Agenda, Theory and Methodology". In *Methods of Critical Discourse Analysis*, edited by Ruth Wodak and Michael Meyer, 1-33. London: Sage.

Zuboff, Shoshana. 2019. *The age of surveillance capitalism*. NewYork: Public Affairs.

Media

Anatel. 2017. "Brasil registra 241 milhões de linhas móveis em operação em setembro de 2017." *Agência Nacional de Telecomunicações*, November 3, 2017. http://www.anatel.gov.br/institucional/noticias-destaque/1805-brasil-registra-241-milhoes-de-linhas-movel-em-operacao-em-setembro-de-2017

Época Negócios. 2018. "Dados são o petróleo da atualidade, diz futurista." June 6, 2018. https://epocanegocios.globo.com/Tecnologia/noticia/2018/06/dados-sao-o-petroleo-da-atualidade-diz-futurista.html

G1. 2018. "Kroton fecha compra da Somos Educação por R$ 4,6 bilhões." *G1 Globo*, April 23, 2018. https://g1.globo.com/economia/noticia/kroton-fecha-compra-da-somos-educacao-por-r-46-bilhoes.ghtml.

Loureiro, Rodrigo. 2018. "Os dados são o novo petróleo". *Isto É Dinheiro*. https://www.istoedinheiro.com.br/os-dados-sao-o-novo-petroleo/

Martelo, Alexandre. 2017. "CADE reprova compra de Estácio pela Kroton Educacional." *G1 Globo*, June 28, 2017.

https://g1.globo.com/economia/negocios/noticia/cade-reprova-compra-da-estacio-pela-kroton-educacional.ghtml.

Mello, Gabriela. 2018. “Kroton nabs Somos for up to $1.8 billion in Brazil education deal.” *Reuters*, April 23, 2018. https://www.reuters.com/article/us-somos-educacao-m-a-kroton/kroton-nabs-somos-for-up-to-1-8-billion-in-brazil-education-deal-idUSKBN1HU1NS.

Porvir. 2018. “Sobre nós.” São Paulo: Inspirare. http://porvir.org/sobre-nos/

Santos, Bárbara Ferreira. 2018. “Apesar de expansão, acesso à internet no Brasil ainda é baixo”. *Exame*, January 29. https://exame.abril.com.br/brasil/apesar-de-expansao-acesso-a-internet-no-brasil-ainda-e-baixo/