# Chapter 9
# The Blockchain University: Disrupting "Disruption"?


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## 9.1 The (Failed) Promise of Technological Disruption

One of the key promises of the Silicon Valley is disruption. During the 1980s companies such as Apple and IBM promised the "disruption" of the paperless office (Sellen & Harper, 2003); in the 1990s the "disruption" of the day was working from home (Daniels et al., 2000); and the early 2000s were marked by the "disruption" of transferring various transactions online, from online shopping (Amazon, Alibaba) to various "e-government" systems such as online taxation (Chatfield, 2009). Starting in the 2010s, the latest generation of "disruptions" is supported by platforms which offer radically new opportunities for using existing (physical) resources (e.g. Airbnb, "disrupting" the accommodation rental market), and which have the power to radically transform the world of labour (e.g. Uber, "disrupting" the transportation market) (Scholz, 2014). With each new generation, these "disruptions" have entered deeper and deeper into the fabric of society. Paperless offices required various legislative changes such as the development of digital signatures, online shops required the development of robust online payment protocols, and contemporary platforms require significant transformations in labour legislation (Williamson, 2020).

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Writing about these trends and promises we deliberately wrapped the word "disruption" in quotation marks because their reality is not all that it is cracked up to be. Our offices are more packed with paper than ever; working from home is suitable only for certain people and certain types of jobs, online shops and taxation systems are restricted to the privileged side of the digital divide, and platforms such as Airbnb and Uber have only exacerbated existing problems in housing and transportation. To add insult to injury, the disruptions promised by these platforms typically introduce new and previously unforeseen problems. For instance, Airbnb has now been proved to cause gentrification, thus pricing out young families from the real estate markets, and significantly lowering locals' quality of life, so it has recently been either banned or heavily regulated in many tourist cities (O'Sullivan, 2018). Furthermore, the very notion of disruption is an ideological construct developed to serve a certain type of capitalist development (Jandrić, 2017; Platform Cooperativism Consortium, 2019). Technologies are far from neutral in these processes. Already in 2010, Tarleton Gillespie wrote:

> A term like "platform" does not drop from the sky (. . .) It is drawn from the available cultural vocabulary by stakeholders with specific aims, and carefully massaged so as to have particular resonance for particular audiences inside particular discourses. These are efforts not only to sell, convince, persuade, protect, triumph or condemn, but to make claims about what these technologies are and are not, and what should and should not be expected of them. In other words, they represent an attempt to establish the very criteria by which these technologies will be judged, built directly into the terms by which we know them. (Gillespie, 2010: 359)

With an understanding of Uber drivers as independent contractors without any rights to social and health security, and similar moves, the latest platform disruptions arriving from Silicon Valley have contributed to development of new forms of worker exploitation. Technological disruption comes in hand with social disruption, and authors such as Nick Srnicek (2016) are increasingly exploring these latest transformations using the concept of platform capitalism.

Similar trends can easily be tracked in educational technology. The first widely used Learning Management Systems (LMS) such as WebCT and Blackboard promised various disruptions of teaching and learning: independence of time and space of learning, access to video lectures given by the best experts, and so on. Those of us who are old enough to have worked in various early versions of Internet-supported distance education including e-learning, Technology Enhanced Learning, and others can well remember issues related to untested software, slow and unreliable connections, and—above all—lack of pedagogical understanding of how these technologies might be used. Back in the day, institutional misunderstandings concerning workload models and the amount of time it takes to design online learning to a high standard and to support students in this new environment were quite common. Yet the belief that technologies are here to disrupt education has remained strong. In the early 2010s, Massive Open Online Courses (MOOCs) were announced as the latest technological disruption of (higher) education. Rather than MOOC platforms themselves radically challenging traditional forms of education, they presented an opportunity to reimagine how the campus degree might be conceived, thus raising too,

questions about widening participation, quality assurance and enhancement, and pedagogy (Hayes, 2015). Whilst MOOCs could perhaps have fundamentally challenged current models of education, the related academic labour became subject instead, to the existing discourse of quality, audit and excellence (Hayes, 2019: 48). Only a few years later, we now realize that the MOOCs are also just another vehicle for capitalist development (Knox, 2016; see also Jandrić, 2017: Ch 9). Education has also succumbed to the siren call of platform capitalism, and "[e]ven if online platforms will never replace schools or universities, they will likely have a substantial impact on how education becomes redefined as a public good." (van Dijck & Poell, 2018).

While these technological disruptions have definitely contributed to the development of the neoliberal managerialist university, academic workers are still more shielded than warehouse workers and taxi drivers. Yet, it has become obvious—in fields from commerce, lodging, transportation, education, and others—that the Silicon Valley model of "disruption" has dire social consequences. One of these in particular revolves around the importance of trust. Trust as a human value is deeply intertwined with how technological disruption could play out democratically and perhaps less exploitatively. Trust is the main prerequisite in human-technology relationships, "yet the inherent untrustworthiness of digital technologies indicates that we should place more value on trust in other human beings. Trust is cultivated from emotion and belief, yet it results in decisions about objective truth. Trust links our past and present (represented by data, information and knowledge) and our future (represented by wisdom)" (Jandrić, 2018: 110). Whilst trust is important in any number of social contexts, in higher education "the very notion of academic freedom is predicated on a foundation of trust" and "for universities to become more innovative and risk-taking trust is essential" (Vidovich & Currie, 2011).

Yet just as Facebook, Amazon, Google, Uber and Airbnb have been criticized for extractive and exploitative practices, in an increasingly platformized university (van Dijck & Poell, 2018), many teaching staff now hold precarious contracts. Additionally, a form of platform capitalism, increasingly present in universities, has potential to further undermine trust through datafication and algorithmization of teaching, learning, and research. In this vein, Ben Williamson shows that

> education analytics, adaptive learning platforms and other "smart learning tools", as well as data dashboards and visualizations used by HE leaders and policymakers to support decision-making processes, are set to be plugged into the architecture of the university, in ways that will impose new modes of quantification and standardization while also bringing new actors and priorities from across the public and private sectors into contemporary HE (Williamson, 2018).

The promise of standardization may inspire trust in many people; after all, one of its key underpinnings is equal treatment of everyone. However, standardization described by Williamson is fully based on big data and algorithmic processing of big data, and these are far from neutral. "One important quality issue is data bias, which appears in different forms. These biases affect the (machine learning) algorithms that we design to improve the user experience. This problem is further exacerbated by biases that are added by these algorithms, especially in the context

of recommendation and personalization systems" (Baeza-Yates, 2016). Therefore, shows Jandrić, "AI systems do not only embed, replicate or reinforce attitudes or prejudices found in data—more importantly, they also recombine them and produce new biases" (Jandrić, 2019: 32). The promise of data-based and algorithm-based standardization, therefore, is an ideological framing for processes which are inherently biased. This leaves us questioning what form of disruption might be powerful enough to interrupt this complex web of sociotechnical infrastructure which is "fusing with political reforms in the shaping of a marketized sector of smarter universities" (Williamson, 2018).

These days, there are plenty of critiques of dataification and platformization of education (Williamson, 2020; Williamson et al., 2020). In the early 2020s, we are also witnessing an increasing number of attempts at creating radically different models of techno-administrative disruptions. One of the most active organizations in this area, the Platform Cooperativism Consortium, spells out the following vision for development of these models:

> In the face of widespread dissatisfaction with capitalism, it is time to ask, "What kind of new economy do we want to create?" Instead of optimizing the online economy for growth and short-term profits for the few, we need to optimize the digital economy for all people.
>
> **Platform co-ops offer a near-future, alternative to platform capitalism based on cooperative principles such as democratic ownership and governance.** (. . .)
>
> **Platform co-ops introduce economic fairness, training, and democratic participation in the running of online businesses.** (. . .)
>
> **Platform co-ops give stakeholders a say in what happens on the platforms.** (Platform Cooperativism Consortium, 2019, bold from the original)

As of very recently, similar attempts at using platform technology have started to spring in education. A 2016 article, "Uber-U is Already Here" (Teachonline, 2016), provides an early vision of a possible platform-based disruption of education. The idea, in a nutshell, is to use a mix of recently developed technologies to develop an educational infrastructure aimed against neoliberalization of education. The mix includes "a mobile app that enables a user to connect to a central hub, which then connects student needs with available tutoring or other forms of help from around the world"; a tracking system for transfer of fees, an online assessment platform, and "a blockchain system which records all aspects of every transaction" (Teachonline, 2016). In 2018, a similar mix of technologies has been used to develop the first "blockchain university" aimed at challenging the capitalist mode of educational development. This paper analyses the first blockchain university—the Woolf University (2019). Focusing on the ideological underpinnings of the Woolf University, the paper examines the theoretical opportunities offered by platform technologies for radical non-capitalist disruption of higher education. In this context we question whether an opportunity has finally arrived. . . to really disrupt "disruption".

## 9.2 Historical Predecessors: Ivan Illich's Educational Networks

The Silicon Valley mode of "disruption" has indeed become mainstream in the past few decades yet attempts at creating radically different models of techno-administrative disruptions also have their own history. In the mid-twentieth century theorists such as Everett Reimer, Ivan Illich, Paul Goodman, and John Holt developed extensive critiques of the institution of schooling. Yet Ivan Illich, in his book Deschooling Society (1971), reaches far beyond critique and offers a full-on technological disruption of education. Just like the Platform Cooperativism Consortium, the Woolf University, and others, Illich has proposed his own version of "large scale non-institutional educational infrastructure" (Jandrić, 2014: 85). In Illich's proposal, this system consists of a set of four interlocking educational networks:

1. Reference Services to Educational Objects-which facilitate access to things or processes used for formal learning. (. . .)
2. Skill Exchanges—which permit people to list their skills, the conditions under which they are willing to serve as models for others who want to learn these skills, and the addresses at which they can be reached. (. . .)
3. Peer-Matching-a communications network which permits people to describe the learning activity in which they wish to engage, in the hope of finding a partner for the inquiry.
4. Reference Services to Educators-at-Large—who can be listed in a directory giving the addresses and self-descriptions of professionals, paraprofessionals, and freelancers, along with conditions of access to their services. (Illich, 1971: 34)

Illich's networks reach much further than technology, and provide a whole-rounded infrastructure which allows radically different forms of learning. Illich does not offer another techno-administrative disruption, but a whole new worldview and radically different social arrangements. Thusly, Illich does not stop at development of infrastructures and recognizes the dialectic between education, the capitalist mode of growth-based development, and ecological destruction of our planet. Illich's educational infrastructure is much more than an attempt at developing a different mode of learning and implies a whole-rounded vision of a future post-capitalist society. In this way, Illich's proposals are fundamentally different from platform capitalist education aimed at standardization and cost reduction.

Purely fictional at the time of their publishing, Illich's ideas have been surprisingly prophetic and therefore are periodically revisited by scholars working in various fields in and around technology and education. At the brink of the millennium, Hart shows that "it is not too far-fetched to assert that Illich predicted the World Wide Web" (Hart, 2001: 72). Ten years later, Jandrić shows Illich's educational networks are "strikingly similar to the basic principles of Wikipedia" (2010: 54), and more widely, that it now "seems that something so unimaginable to the average citizen of the mass society such as large-scale deschooling has been made possible by the advent of the network society" (Jandrić, 2014: 96). While Illich's educational networks now belong deeply to the past, his important insights about connections between education, technology, capitalism and the environment serve as indispensable starting points for analysis. Therefore, it is hardly a surprise that

Illich's work is a permanent inspiration for the field of networked learning (Networked Learning Editorial Collective, 2020; Jandrić & Boras, 2015).

## 9.3 Uber for Students, Airbnb for Teachers

In 2018 an independent group of scholars affiliated with the University of Oxford developed "the first blockchain-powered university with its own native token" (Broggi et al., 2018). The Woolf University (named after Virginia Woolf) is "a platform startup that aims to leverage distributed ledger technology to remove higher education intermediaries, support decentralized governance structures and ensure the security of data" (Vander Ark, 2018). Combining platform technology used by the likes of Uber and Airbnb with blockchain technology behind safe transactions of cryptocurrencies such as bitcoin, the Woolf University now aims at disrupting higher education. In the Woolf University, however, safe transactions are not just about money transfer; instead, they are being used for management of acquired learners' credentials.

Before discussing the use of blockchain in terms of potential disruption within this political economic context, a brief explanation of what blockchain is, will be needed. Blockchain is a distributed database, or a growing list of records called blocks, linked through a form of secure communication called cryptography. Ian O'Byrne describes blockchain as "a public ledger of transactions that is composed of two parts: peer-to-peer (P2P) network, and a decentralized, distributed database" (2016). A P2P network is an architecture of computers that share tasks or files between peers. Each peer is a partner in the network, with equal privileges and powers. Napster is an early example of such file sharing, in relation to audio files. The P2P network in Blockchain is decentralized, so that when information is passed between peer computers (nodes) there is no central point of potential failure in the system. All nodes eventually receive the same information, which is usually encrypted and private and there is no way to know identities of who added or removed information to the network.

The second element of the blockchain, the database of transactions, refers to the information that is being shared across the P2P network. The first element in this database is referred to as the "genesis block", or the first "block" of the blockchain, usually containing the guidelines for the remaining database, which is formed by a series of blocks that link together to form a chain. Information added or removed from the blocks is date and time stamped, thus creating an encrypted ledger, documenting the resources in the database. It is this mixture of transactions, blocks, and decentralization of data in the ledger that provides tremendous opportunities for many fields (O'Byrne, 2016).

Based on blockchain technology, the Woolf's university White Paper offers a series of revolutionary promises:

> Woolf will be a borderless, digital educational society which reimagines how teachers and students connect. It will rely on blockchains and smart contracts to guarantee relationships between students and educators. For students, it will be the Uber of degree courses; for teachers, it will be the Airbnb of course hosting, but for both parties the use of blockchain technology will provide the contractual stability needed to complete a full course of study.
>
> It is our view that the model set out in this white paper will disrupt the economics of higher education and provide new opportunities for both students and academics. Blockchains with smart contracts can automate administrative processes and reduce overhead costs. Students can study with lower tuition and academics can be paid higher salaries.
>
> It is our ambition that Woolf be a revolution without precedent in the history of the university. But at its core, Woolf makes possible the oldest and most venerable form of human education: direct personal, individual apprenticeships in thinking. (Broggi et al., 2018: 1)

While this imagined revolution would inevitably bring about significant social changes, the Woolf University is much more moderate than Illich (or indeed the Platform Cooperativism Consortium) and does not outline a whole-rounded vision of a future society. Therefore, we need to take a closer look into problems that it addresses.

The Woolf University's White Paper identifies four key problems in the contemporary university: (1) The incentive problem. University administrators are incentivized to increase positivist quality criteria, students are incentivized to take large student loans and play "safely" while they study, and teachers are incentivized to prioritize administration, research, and funding over teaching. (2) The opaque barrier problem. Students and teachers are incentivized to trust opaque decision-making processes and people lack democratic mechanisms to decide about their own destiny. (3) The "market-maker" problem. As administration takes up an increasing part in university finances, student fees get higher while academic salaries get lower. (4) The market liquidity problem. Depending on their location and available resources, some teachers get out of work while others get overworked; some students cannot reach teachers while others can reach more than they can use (Broggi et al., 2018: 7–8). Consequences of these problems are radical precarization of teachers, high cost of education for students, and the loss of traditional social role of the university (Broggi et al., 2018: 8–11).

In response to these problems and consequences, the rest of the White Paper describes in detail "The Woolf University Solution":

> As the first blockchain university, Woolf will use new technologies to reimagine how students can connect with professors in a personal but geographically agnostic manner. This allows any student with access to a smartphone or computer to have access to a world-class education, no matter where they are in the world. But at its core, Woolf makes possible one of the oldest ways that human beings really learn, which is through individual teaching and instruction. Such instruction simply cannot be provided by a bureaucratic system or a podcast or a MOOC or a book—although these are all potentially important.
>
> Woolf uses novel forms of organization to support the most traditional kind of teaching, namely, one-to-one and one-to-two Oxbridge-style tutorials in which teachers come to understand the intellectual needs of their students, and students can be given an academic apprenticeship in thinking. (Broggi et al., 2018: 11).

In response to the White Paper, David Kernohan critiques its strong focus to technology and asserts that there is a need to "move beyond the techno-fetishism of their white paper to take ownership of a moment that would separate them from a million other over-hyped blockchain ideas" (Kernohan, 2018). While these and other critiques are certainly valid, it remains to be seen what will happen in practice. The Woolf University is still in early stages of development and the first cohort of students is supposed to enrol in the first half of 2020 (Broggi et al., 2018: 55). Both authors of this paper have joined the Woolf University as teachers, and plan to further develop this research over a lengthy period of time. In order to prepare directions for further research, in this paper we focus to ideological underpinnings of currently available information on the Blockchain University.

## 9.4 The Ideology of the Blockchain University

In this section we firstly discuss our interpretation of ideology, in relation to technology and education. We then consider some ideological underpinnings, based on what is known so far, about the blockchain university.

Our understanding of ideology concerns the beliefs, values and opinions held by people that closely intersect with the powerful political, educational and economic structures of the society in which we live. We take the position that such political beliefs and socio-cultural practices are also dialectically intertwined with both technology and the language that is used by people to speak about technology, in relation to education. As such, ideologies become expressions of how "the use of technology" is being interpreted, to achieve certain goals in an educational context (Hayes, 2019: 102). In turn, these relationships need to be understood in the context of how they may contribute to, and maintain, neoliberal organizations and related inequalities, in the onset of platform capitalism.

Blockchain technology is based on the idea of delegating trust away from centralized institutions and placing trust instead into a technical architecture. For instance, instead of being handled by the Student Office, learner credentials are now managed using the Woolf University's dedicated platform. This brings about strong individualization, as individual students and tutors now interact with algorithmic platforms that algorithmically curate content and match different users. Whether this implies that people no longer have to trust in each other is a further point for debate, especially if trust is being placed into networks and algorithms. Yet this technology also connects people interested in cooperative forms of working, based on trust, lending itself to education.

Probably the most widely used definition of networked learning is "learning in which information and communication technology is used to promote connections: between one learner and other learners, between learners and tutors; between a learning community and its learning resources" (Goodyear et al., 2004: 1). This definition is relational (Jones, 2015), because all elements mentioned in the definition are interconnected with each other and permanently transformed. In a recent set

of papers, the networked learning community has updated this definition with a strong accent to emancipation and critical pedagogy (Networked Learning Editorial Collective, 2020; Networked Learning Editorial Collective et al., 2021). Technological transformations necessarily impact learners, tutors, communities, and resources; learner transformations necessarily impact tutors, communities, resources and technologies; and so on. The networked learning perspective thus enables development of whole-rounded understanding of educational disruption offered by the blockchain—and this type of understanding, we argue, is crucial for understanding the effects of practices such as the Woolf University.

Few are (as yet) adopting the blockchain for educational purposes, despite claims from some that they are actively exploring this possibility. Blockchain can enable tracking of every block of learning that people ever undertake across a platform (wherever they may be located in the world) and credit them with this learning. The ideological elements come into play when particular claims become attached to the use of such a platform. In an article called "Learning is Earning" (Act Foundation, 2016), a digital platform called the Ledger is described that directly connects everything people learn with directly related earning power. A connection is made with a new speculative economy where employers might invest in building a workforce for the most lucrative skills tracked by the Ledger.

Where once universities might have stood apart somewhat from defining learning in direct connection with earning, since the introduction and/or significant increase of student fees in most Western countries at the end of the twentieth century there has been a much stronger focus on "employability" and a growing awareness of potential "technological unemployment" (Peters et al., 2019). Ben Williamson describes too, how education is changing in an emerging "platform society", with sociotechnical data assemblages of for-profit platforms merging with key public institutions. Student and teacher subjectivities then become reshaped by the presumptions and worldviews encoded in digital platforms (Williamson, 2018).

Amidst these concerns, in 2018, David Kernohan wrote:

> Woolf University might come on like another technology-driven disruptor but really it's a restatement of the oldest idea in higher education: scholars banding together to support each other. The mechanisms may be new, the underpinning may be modish, but there is a straight line between our romanticized vision of 11th century Bologna and a fortuitous conversation between blockchain researchers and humanities lecturers at Wolfson College, Oxford in 2017 (Kernohan, 2018)

At the time of writing, David Kernohan remained unconvinced of any clear benefits (as yet) of adopting blockchain technology over other existing options for Woolf. However, in describing his conversation with Josh Broggi and Martin Gallagher, two founding members of the Woolf team, he refers to the best moments as:

> when they let go of the technology and talked about the pedagogy. Both were passionate about the benefits of the tutorial model, and vehement about the critical and analytical skills that could be taught by sustained interaction with philosophy, theology, and the classics. Both suggested that such skills are not at threat from automation, and I would agree. It made me reflect how long it had been since I'd heard such a powerful case for high-level

> humanities teaching put as well within the mainstream sector. And it all ties in neatly to their wider concerns around how little control academic staff have over their own working lives (Kernohan, 2018)

As Woolf moves forward in developing their tutorial model, this appears to take the use of blockchain in a rather different direction from simply building a workforce through the precarious labour of fixed term academic contracts to directly meet the needs of employers. As such, the ideology behind Woolf does appear to be genuinely refocusing on the relationships between students and educators as a central starting point, placing value on at least some of the aspects of Illich's proposal. As Uber for students and Airbnb for teachers, the question remains as to whether Woolf will now adopt the blockchain in such a manner as to radically disrupt "disruption", or will simply blend into the existing powerful political, educational and economic structures of the society in which we live. That would not be an unusual path—few years ago MOOCs also promised openness and democratization of knowledge, but soon got fully integrated into the neoliberal academia (Knox, 2016).

## 9.5 Conclusions

For academic staff who rely upon their collegial networks and have increasingly found a need to build these beyond the institutional constraints of neoliberal forms of education, Woolf holds a seductive promise. For students who have long craved a personal contact with their tutors that has eluded them, despite paying crippling tuition fees, there is likely to be an attraction too. Such a move, as we argue earlier in this chapter, will be best supported by adopting a networked learning perspective and especially its wide body of knowledge about various (learning) connections.

Yet perhaps one of the most disruptive aspects of Woolf is in fact their aim to create a university in which the bulk of administrative tasks are either eliminated or progressively automated. This essentially removes the middleman from the teaching relationship. It allows professors to organize their own colleges, teach and take payments from students directly. Using the same logic as Airbnb, Woolf claims that this makes better use of academic resources. In this sense, the Woolf university is still deeply imbued in the existing logic of platform capitalism (Srnicek, 2016; Williamson, 2020) and does not offer a whole-rounded social Illichean disruption. Unlike Illich (1971), who sought for replacement of the Promethean logic of capitalism based on growth with am Epimethean logic focused to balance between humanity and its environment, the Woolf University has merely applied platform logic on top of existing capitalist relationships. However, the Woolf University also offers potential to radically change the current model of platform capitalism in universities, because it begins from a shared pedagogy and academic freedom to teach, rather than from administration and the bureaucratic audit of teaching. Thus, it seems that the Woolf University attempts at developing its own version of networked learning using a curious combination of traditional scholastic approaches and latest technological developments.

The Woolf University disruption comes not from a platform alone, though the technology plays an important part, but from like-minded people working cooperatively. For students, whose collective identity in HE has been constructed and marketed back to them in recent years (Hayes, 2019), presenting them as susceptible consumers, Woolf could be an empowering route into cooperative learning. For teachers, disempowered by managerialist policies into precarity, Woolf could be an empowering route into cooperative working. Additionally, there is the opportunity to build skills that are less at threat from automation. Applying many principles of networked learning, often without acknowledging their origins, the Woolf university offers an interesting experiment at the fringes of educational mainstream. Looking ahead to future research in this area, we raise the question of whether the Woolf University makes for a return to core academic values, underpinned by a cooperative platform to aid transparency, and based on many principles of networked learning, may really hold the techno-administrational resources we need to begin to rebuild academic trust. If the Woolf University's principles indeed get a wider recognition and application in (higher) education, it will be necessary to seriously examine their role in platform university and platform capitalism at large.

## References

ACT Foundation. (2016). *Learning is earning*. Retrieved October 14, 2019, from http://www.learningisearning2026.org

Baeza-Yates, R. (2016). Data and algorithmic bias in the web. In *Proceedings of the 8th ACM Conference on Web Science – WebSci '16*. https://doi.org/10.1145/2908131.2908135

Broggi, J. D., Gallagher, M. A., Lilly, J., Duquette, J., Nimura, C., Pattenden, M., Richter, F., San Martín Arbide, L., Avin, S., Kelley, K., Lidova, M., Rodríguez-Pérez, D., & Winkler, A. (2018). *Woolf: The first blockchain university*. Retrieved October 10, 2019, from https://www.docdroid.net/ebIGXJm/whitepaper3.pdf

Chatfield, A. T. (2009). Public service reform through e-government: A case study of "e-Tax" in Japan. *Electronic Journal of eGovernment, 7*(2), 135–146.

Daniels, K., Lamond, D., & Standen, P. (2000). *Managing telework*. Business Press.

Gillespie, T. (2010). The politics of 'platforms'. *New Media and Society, 12*(3), 347–364.

Goodyear, P., Banks, S., Hodgson, V., & McConnell, D. (Eds.). (2004). *Advances in research on networked learning*. Kluwer.

Hart, I. (2001). Deschooling and the Web: Ivan Illich 30 years on. *Education Media International, 38*(2–3), 69–76.

Hayes, S. (2015). *MOOCs and quality: A review of the recent literature*. Quality Assurance Agency. Retrieved October 12, 2019, from http://repositorio.minedu.gob.pe/bitstream/handle/123456789/4327/MOOCs%20and%20Quality%20A%20Review%20of%20the%20Recent%20Literature.pdf?sequence=1

Hayes, S. (2019). *The labour of words in higher education: Is it time to reoccupy policy?* Brill.

Illich, I. (1971). *Deschooling society*. Marion Boyars.

Jandrić, P. (2010). Wikipedia and education: Anarchist perspectives and virtual practices. *Journal for Critical Education Policy Studies, 8*(2), 48–73.

Jandrić, P. (2014). Deschooling virtuality. *Open Review of Educational Research, 1*(1), 84–98.

Jandrić, P. (2017). *Learning in the age of digital reason*. Sense.

Jandrić, P. (2018). Post-truth and critical pedagogy of trust. In M. A. Peters, S. Rider, M. Hyvönen, & T. Besley (Eds.), *Post-truth, fake news: Viral modernity & higher education* (pp. 101–111). Springer.

Jandrić, P. (2019). The postdigital challenge of critical media literacy. *The International Journal of Critical Media Literacy, 1*(1), 26–37.

Jandrić, P., & Boras, D. (Eds.). (2015). *Critical learning in digital networks*. Springer.

Jones, C. (2015). *Networked Learning: An Educational Paradigm for the Age of Digital Networks*. Springer.

Kernohan, D. (2018). Hungry like the Woolf. *Wonkhe*, 12 April, 2018. Retrieved October 12, 2019, from https://wonkhe.com/blogs/hungry-like-the-woolf-the-first-blockchain-university/

Knox, J. (2016). *Posthumanism and the massive open online course: Contaminating the subject of global education*. Routledge.

Networked Learning Editorial Collective. (2020). Networked learning: Inviting redefinition. *Postdigital Science and Education*. https://doi.org/10.1007/s42438-020-00167-8

Networked Learning Editorial Collective, et al. (2021). Networked learning in 2021: A community definition. *Postdigital Science and Education*. https://doi.org/10.1007/s42438-021-00222-y

O'Sullivan, F. (2018). *Barcelona finds a way to control its Airbnb market*. Retrieved October 10, 2019, from https://www.citylab.com/life/2018/06/barcelona-finds-a-way-to-control-its-airbnb-market/562187/

O'Byrne, W. I. (2016). *What is blockchain?* Retrieved October 12, 2019, from https://medium.com/badge-chain/what-is-blockchain-5e4498f05c20#.v3yban5o7

Peters, M. A., Jandrić, P., & Hayes, S. (2019). The curious promise of educationalising technological unemployment: What can places of learning really do about the future of work? *Educational Philosophy and Theory, 51*(3), 242–254.

Platform Cooperative Consortium. (2019). *Vision and advantages*. Retrieved October 10, 2019, from https://platform.coop/about/vision-and-advantages/

Scholz, T. (2014). *Platform cooperativism vs. the sharing economy*. Retrieved October 10, 2019, from https://medium.com/@trebors/platform-cooperativism-vs-the-sharing-economy-2ea737f1b5ad

Sellen, A. J., & Harper, R. H. R. (2003). *The myth of the paperless office*. The MIT Press.

Srnicek, N. (2016). *Platform capitalism*. Polity.

Teachonline. (2016). *Uber-U is already here*. Retrieved October 10, 2019, from https://teachonline.ca/tools-trends/exploring-future-education/uber-u-already-here

van Dijck, J., & Poell, T. (2018). Social media platforms and education. In J. Burgess, A. Marwick, & T. Poell (Eds.), *The SAGE handbook of social media* (pp. 579–591). SAGE.

Vander Ark, T. (2018). *Imagining a blockchain university*. Retrieved October 10, 2019, from https://www.forbes.com/sites/tomvanderark/2018/06/13/woolf-building-the-first-blockchain-university/#596826b25ae5

Vidovich, L., & Currie, J. (2011). Governance and trust in higher education. *Studies in Higher Education, 36*(1), 43–56.

Williamson, B. (2018). The hidden architecture of higher education: Building a big data infrastructure for the 'smarter university'. *International Journal of Educational Technology in Higher Education, 15*(1), 12.

Williamson, B. (2020). Making markets through digital platforms: Pearson, edu-business, and the (e)valuation of higher education. *Critical Studies in Education*. https://doi.org/10.1080/17508487.2020.1737556

Williamson, B., Bayne, S., & Shay, S. (2020). The datafication of teaching in Higher Education: Critical issues and perspectives. *Teaching in Higher Education, 25*(4), 351–365.

Woolf University. (2019). *Main*. Retrieved October 10, 2019, from https://woolf.university/