

The blockchain university: disrupting 'disruption'?

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Abstract

This paper explores the promise of disruption of higher education offered by latest platform technologies - a combination of mobile applications for connecting teachers and students and blockchain technology for secure transactions of information and money. We start with a brief examination of several generations of technological disruptions arriving from the Silicon Valley with a special focus to educational technology. Showing that these disruptions are primarily focused to furthering capitalist mode of production, we question whether the latest disruption could provide different results. We briefly examine a historical (utopian) attempt at disrupting education described in Ivan Illich's book *Deschooling Society* (1971). While this analysis firmly belongs into the past, it presents us with important insights about connections between education, technology, capitalism and the environment which are just as relevant today. We proceed with an analysis of the world's first blockchain university - the Woolf University. Advertised as 'Uber for students, Airbnb for teachers', the Woolf University offers the seductive promise of radical transformation of higher education based on cooperative principles. We examine blockchain technology in detail and identify its main novelty - the transfer of trust from people to technologies. We briefly question this transfer, leaving a more detailed analysis for further research. Instead we focus to ideological underpinnings of the blockchain university, as they reflect to teaching, learning, and university administration. We show that further analyses of the blockchain university will be best supported by adopting a networked learning perspective and especially its wide body of knowledge about various (learning) connections. The Woolf University has not even admitted its first cohort of students, and the question remains as to whether Woolf will now adopt the blockchain in such a manner as to radically disrupt 'disruption', or it will simply blend into the existing powerful political, educational and economic structures. Our analysis, which is therefore based on early ideas about the development of the Woolf University, indicates that it has the potentials to offer cooperative learning to students, cooperative employment to academic workers, all the while retaining highest quality of teaching and learning modelled after ancient scholastic principles. On that basis, we conclude that the Woolf University, together with other adaptations of blockchain technology for educational purposes, does offer a lot of potential for fundamental disruption of higher education and should be closely watched in the times to come.

Keywords

Disruption, education, networked learning, platform, blockchain, ideology, trust

The (failed) promise of technological disruption

One of the key promises of the Silicon Valley is disruption. During the 1980's companies such as Apple and IBM promised the 'disruption' of the paperless office (Sellen and Harper, 2003); in the 1990's the 'disruption' of the day was working from home (Daniels, Lamond and Standen, 2000); and the early 2000's 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 2010's, the newest 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.

Writing about these trends we deliberately wrapped the word 'disruption' in quotation marks because their promise 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 promised disruptions 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). From appalling work conditions in Amazon's warehouses, to an understanding of Uber drivers as independent contractors without any rights to social and health security, latest disruptions arriving from the Silicon Valley have contributed to development of some of the most ruthless models of exploitation of workers and have turned out to be very powerful vehicles for development of financial 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 have worked in e-learning, Technology Enhanced Learning, and other early versions of Internet-supported distance education, 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).

While these technological disruptions have definitely contributed to 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, rather than exploitatively. 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 and Currie, 2011). Yet just as Facebook, Amazon, Google, Uber and Airbnb have been criticised for extractive and exploitative practices in the gig economy, many teaching staff in universities now hold precarious contracts. Additionally, a form of platform capitalism, increasingly present in universities has potential to further undermine trust:

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).

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).

In the early 2020s, we are now witnessing an increasing number of attempts at creating radically different models of techno-administrative disruptions. One of the most active organisations 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 neoliberalisation 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'.

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-20th 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. However, 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. Therefore, his 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.

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" (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 into the past, his important insights about connections between education, technology, capitalism and the environment serve as indispensable starting points for analysis.

Uber for students, Airbnb for teachers

In 2018 an independent group of academics 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). Crossing 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. 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 incentivised to increase positivist quality criteria, students are incentivised to take large student loans and play 'safely' while they study, and teachers are incentivised to prioritize administration, research, and funding over teaching. (2) The opaque barrier problem. Students and teachers are incentivised to trust opaque decision-making processes and 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 organisation 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).

While it is tempting to proceed with an examination of offered solutions, 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.

The ideology of the blockchain university

In this section we firstly discuss our interpretation of ideology, in relation to technology and education. Secondly, we provide some links to a brief explanation of what blockchain is, and 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 organisations and related inequalities, in the onset of platform capitalism.

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" (O'Byrne, 2016). 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 decentralised, so that when information is passed between peer computers (nodes) there is no central point of 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 decentralisation of data in the ledger that provides tremendous opportunities for many fields (O'Byrne, 2016).

Blockchain technology is based on the idea of delegating trust away from centralised institutions and placing trust instead into a technical architecture. Whether this implies that people no longer have to trust in each other is a further point for debate, if trust is being placed into an algorithm. 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, Banks, Hodgson and McConnell, 2004: 1). This definition is relational (Jones, 2012: 3), because all elements of the definition are interconnected with each other and permanently transformed. 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 of student fees there has been a much stronger focus on 'employability' and a growing awareness of potential 'technological unemployment' (Peters, Jandrić and Hayes, 2018). Ben Williamson describes too, how education is changing in an emerging 'platform society', with socio-technical 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 in *Wonkhe*:

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 romanticised 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 like MOOCs, will simply blend into the existing powerful political, educational and economic structures of the society in which we live.

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 alluded them, despite paying crippling tuition fees, there is likely to be an attraction too. For David Kernohan, 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). Such a move, as we argue earlier in this article, 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 organise 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. As such, it 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.

This is a disruption too that 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. Therefore, looking ahead to future research in this area, we raise the question of whether such a return to core academic values, underpinned by a cooperative platform to aid transparency, may really hold the techno-administrational resources we need to begin to rebuild academic trust.

References

- ACT Foundation (2016). Learning is Earning. <http://www.learningisearning2026.org> [viewed 14 October 2019].
- Broggi, J. D., Gallagher, M. A., Lilly, J., Duquette, J., Nimura, C., Pattenden, M., Richter, F., San Martín Arvide, L., Avin, S., Kelley, K., Lidova, M., Rodríguez-Pérez, D., & Winkler, A. (2018). Woolf: The First Blockchain University. <https://www.docdroid.net/ebIGXJm/whitepaper3.pdf> [viewed 10 October 2019].
- 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*. London: Business Press.
- Goodyear, P.; Banks, S.; Hodgson, V. & McConnell, D. (Eds). (2004). *Advances in Research on Networked Learning*. Dordrecht: 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. <http://repositorio.minedu.gob.pe/bitstream/handle/123456789/4327/MOOCs%20and%20Quality%20A%20Review%20of%20the%20Recent%20Literature.pdf?sequence=1> [viewed 12 October 2019].
- Hayes, S. (2019) *The Labour of Words in Higher Education: is it time to reoccupy policy?* Brill
- Illich, I. (1971). *Deschooling society*. London: 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*. Rotterdam: Sense.
- Kernohan, D. (2018). Hungry like the Woolf. *Wonkhe*, 12 April, 2018: <https://wonkhe.com/blogs/hungry-like-the-woolf-the-first-blockchain-university/> [viewed 12 October 2019].
- Knox, J. (2016). *Posthumanism and the massive open online course: Contaminating the subject of global education*. New York: Routledge.
- O'Byrne, W., I. (2016). What is Blockchain? <https://medium.com/badge-chain/what-is-blockchain-5e4498f05c20#.v3yban5o7> [viewed 12 October 2019].
- O'Sullivan, F. (2018). Barcelona Finds a Way to Control Its Airbnb Market. <https://www.citylab.com/life/2018/06/barcelona-finds-a-way-to-control-its-airbnb-market/562187/> [viewed 10 October 2019].
- Peters, M. A., Jandrić, P. and Hayes, S. (2018). 'The curious promise of educationalising technological unemployment: What can places of learning really do about the future of work?' *Journal of Educational Philosophy and Theory*
- Platform Cooperative Consortium (2019). Vision and advantages. <https://platform.coop/about/vision-and-advantages/> [viewed 10 October 2019].
- Scholz, T. (2014). Platform Cooperativism vs. the Sharing Economy. <https://medium.com/@trebors/platform-cooperativism-vs-the-sharing-economy-2ea737f1b5ad> [viewed 10 October 2019].
- Sellen, A. J. & Harper, R. H. R. (2003). *The Myth of the Paperless Office*. Cambridge, MA: The MIT Press.
- Teachonline (2016). Uber-U is Already Here. <https://teachonline.ca/tools-trends/exploring-future-education/uber-u-already-here> [viewed 10 October 2019].
- Vander Ark, T. (2018). Imagining A Blockchain University. <https://www.forbes.com/sites/tomvanderark/2018/06/13/woolf-building-the-first-blockchain-university/#596826b25ae5> [viewed 10 October 2019].
- 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.
- Woolf University (2019). Main. <https://woolf.university/> [viewed 10 October 2019].