

# Postdigital education in a biotech future

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**Petar Jandrić** 

Zagreb University of Applied Sciences, Zagreb, Croatia; University of Wolverhampton, Wolverhampton, UK

**Sarah Hayes**

University of Wolverhampton, Wolverhampton, UK

## Abstract

This paper explores a possible future of postdigital education in 2050 using the means of social science fiction. The first part of the paper introduces the shift from 20<sup>th</sup> century primacy of physics to 21<sup>st</sup> century primacy of biology with an accent to new postdigital–biodigital reconfigurations and challenges in and after the COVID-19 pandemic. The second part of the paper presents a fictional speech at the graduation ceremony of a fictional military academy in a fictional East Asian country in 2050. This fictional world is marked by global warfare and militarization, and addressed graduates are the first generation of artificially evolved graduates in human history. The third part of the paper interprets the fictional narrative, contextualizes it into educational challenges of today, and argues for a dialogical, humanistic conception of new postdigital education in a biotech future.

## Keywords

Postdigital, biodigital, education, futures, biotechnology, bioeconomy, speculative fiction, social science fiction, COVID-19

## Introduction

In 2020, the world has experienced a devastating pandemic of Severe Acute Respiratory Syndrome Coronavirus 2. In less than a year, medicine has produced several vaccines ([World Health Organization, 2021](#)); the social sciences have addressed various forms of inequality ([Hurley, 2020](#); [Khan et al., 2020](#); [Traxler et al., 2020](#)), and educators have produced the largest switch to home schooling in human history ([Jandrić et al., 2020](#)). The COVID-19 crisis has arrived on top of crises caused by natural events such as earthquakes, and crises caused by human activity such as global warming ([Jandrić, 2020a, 2020b](#)). Furthermore, the COVID-19 crisis has brought into the

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### Corresponding author:

Petar Jandrić, Zagreb University of Applied Sciences, Vrbik 8, Zagreb 10000, Croatia; University of Wolverhampton, Wolverhampton, UK.

Email: [pjandric@tvz.hr](mailto:pjandric@tvz.hr)

fore a significant change from the 20<sup>th</sup> century primacy of physics (nuclear technology, computers, networking, etc.) to the 21<sup>st</sup> century primacy of biology (genetic engineering, virology, bioeconomy, etc.). Already in 2007, Dyson wrote:

Biology is now bigger than physics, as measured by the size of budgets, by the size of the workforce, or by the output of major discoveries; and biology is likely to remain the biggest part of science through the 21st century. Biology is also more important than physics, as measured by its economic consequences, by its ethical implications, or by its effects on human welfare. (Dyson, 2007)

While the world is still justifiably focused to the immediate effects of the COVID-19 pandemic, and their relationships with other contemporary crises such as global warming, we have decided to delve deep into philosophy and theory of our biodigital reality. In the early days of the pandemic, Michael Peters, Peter McLaren, Petar Jandrić and Tina Besley, developed a theory of viral modernity which ‘is a concept based upon the nature of viruses, the ancient and critical role they play in evolution and culture, and the basic application to understanding the role of information and forms of bioinformation in the social world’ (Peters et al., 2020; see also Peters and Besley, 2020). Soon after, Peters, Jandrić and Hayes published a set of related papers on biodigital philosophy, technological convergence and new knowledge ecologies (Peters et al., 2021a), biodigital technologies and the bioeconomy ecologies (Peters et al., 2021b), the emerging reconfiguration between the postdigital and the biodigital (Peters et al., 2021c), and about changes in production and dissemination of knowledge needed to address these challenges (Peters et al., 2021d).

This research indicates that the COVID-19 crisis is indeed a part of a larger ecosystem of crises facing humanity, and that solutions to these crises are closely linked to the fundamental transfer of the primacy of physics towards the primacy of biology in human affairs (Dyson 2007). This requires a development of new critical philosophies and new social practices, and education is at the forefront of these developments. However, these research efforts are still in their infancy. Older research trajectories such as the ecopedagogy movement have explored relationships between education, social justice, and the environment for decades (Kahn, 2010; Misiaszek, 2020); by now, they have barely scratched the biodigital challenge. Ben Williamson has extensively researched rapidly developing applications of neurology in education (Williamson 2019a), and has situated these efforts in a wider ‘emerging combination of psychological, neuroscientific and genetic expertise, with a particular emphasis on using advanced computational technologies to produce “intimate data” about students’ bodies and biological associations with learning’ under the name of ‘precision education’ (Williamson 2019b). (Pickersgill, 2020), Johnson et al. (2020), and others have focused to relationships between education and epigenetics (the study of heritable changes in gene expression).<sup>1</sup> Based on these works, (Peters and Jandrić, 2019), Jandrić and Ford, 2020 and (Jandrić et al., 2021) have explored relationships between education and our biodigital–postdigital reality.

This work is inextricably linked to a rich body of posthumanist literature, from more general insights such as Haraway (1991) [1985], and Hayles’ (2006) to writers focusing more specifically to education (Bayne 2015; Savin-Baden 2021). Then there is transhumanist literature (Kurzweil 2005) and of course a myriad of questions arising from differences between (various understandings of) posthumanism and transhumanism (Malapi-Nelson 2021). Omitting these issues would be a methodological error and missed opportunity, yet elaborating them deeper would take this article into a very different direction. As we develop this article, therefore, we will broadly assume that we are dealing with broadly defined postdigital humans (Savin-Baden 2021), and we

will leave interpretation of (many) implications of our decision to the readers and future researchers.

As of recently, themes covered in this brief literature overview have started to attract attention from organizations such as UNESCO (for a detailed overview, see [Peters et al., 2021b](#)) and research funding<sup>1</sup>. After a year of research in the field, we still find it hard to find this recent work, which is scattered throughout educational journals and squeezed between traditional education articles. We find it even harder to get a sense of this diverse body of work. Cutting across disciplines, using different jargons and approached using different methodologies, postdigital–biodigital research in education is in the earliest stages of primitive accumulation.

Working in such unfavourable conditions, we immediately welcomed the opportunity to explore some actualities of our bioinformational reality and their likely developments in the near future using the perspective of futures studies. This exercise has two main goals. First, we need ‘to make sense of abstract, theoretical, academic ideas, and to discuss those ideas with both academic and non-academic audiences’ ([Kupferman, 2020a](#)). Second, ‘[w]e need fleshed out depictions of what educational futures look like. We need to widen our understanding of what our texts and areas of inquiry look like. We need to be creative and develop infinite point scenarios. And we need to have some fun’ ([Kupferman, 2020a](#)). Responding to [Costello et al.’s \(2020: 619–620\)](#) ‘call for other historians of futures past to help uncover timelines, and write alternative fictions’, this paper develops an exercise in speculative fiction ([Graham et al., 2019](#)), more precisely its subspecies social science fiction ([Gerlach and Hamilton, 2003](#)), to provoke thinking about what our biotech future may look like and which new educational challenges it may face (see [Selwyn et al., 2020](#)). Following [Kupferman \(2020a\)](#), we conclude with an analysis of ‘questions entirely in the future tense, so that if this will be the case, then some other sort of outcome might result’.

With this in mind, we now proceed to the next step in the article – our social science fiction. According to [Encyclopaedia.com \(2021\)](#), ‘[t]he term “social science fiction” can usefully be employed to identify narratives that extrapolate from current social science concepts in order to predict or speculate about the future shape of society. This new genre of fiction stems from two literary traditions: the modern Utopias and dystopias...’. Our fictional piece is neither utopian nor dystopian; it simply presents one possible future which we find interesting for analysis. We situated our story in China because of its growing biotech industry and global influence, yet this choice was fairly random, as our narrative would make an equally good fit to any global superpower from the US through Russia to Brazil. For brevity and style, the story does not reflect its posthumanist implications; these are left to the reader and for later analysis.

Speech at a Graduation Ceremony, The United Countries of South East Asia Military Academy

Beijing, 15 June 2070

To all of you the graduates, I extend my warmest congratulations on this special day for you and your makers. Welcome to the graduation ceremony of the first generation of the United Countries of South East Asia Military Academy.

This graduation ceremony is significant in two major ways. Five years ago, in 2045, China finally peacefully united with its neighbouring countries formerly known as Bhutan, Laos, Myanmar, Malaysia, Nepal, North Korea, South Korea, Philippines, Singapore, Vietnam and Thailand, and formed the United Countries of South East Asia under the leadership of the People’s Republic of China and our beloved leader Qiqiang Xing. At that time, the famous Republic of China Military Academy has been renamed to the United Countries of South East Asia Military Academy, and you

are its first graduates. Indeed all of you who are graduating today are joining the ranks of such distinguished alumni of this University as Chen Cheng, Du Yuming, Xue Yue, Hu Zongnan, Hu Lien, Guan Linzheng, Lin Biao, Xu Xiangqian, Zuo Quan, Liu Zhidan and Chen Geng – men who not only provided military leadership for China, but who also exerted a huge influence on Chinese policy and governance. I am sure that you will exert even stronger influence, at this turning point in humanity's history, to the United Countries of South East Asia and the world at large.

Dear graduates, please allow me to support this strong claim with arguments. As you well know, you are the first graduates of any military academy in human history, who were not born by living mothers. In 2047, due to the incredible foresight of the Chinese Communist party and our beloved leader Qiqiang Xing, you were designed and brought to life by the best scientists of the People's Republic of China. Your flesh looks just like my flesh, your words sound just like my words. But your strength, stamina, and intellectual capability is incomparable to any of us natural born humans. These gifts arrive with a high cost, and I believe it is worthwhile to remind ourselves of how they arrived into being.

Fifty years ago, in 2020, the COVID-19 pandemic caused a strong increase in funding of biotech research. In a few short years, researchers almost completely erased borders between wet *bios* and dry *techne*; biology has become dialectically intertwined with information. This has allowed new, previously unimaginable opportunities for tinkering with living systems – changing the genotype and phenotype of living beings and growing completely new forms of life. Led by noble ethical and legal principles, large biotech laboratories did a lot of good for humanity. For those of us who can afford it, pandemics are no more; genetic illnesses are pretty much erased; and eating our steaks does not imply killing animals.

But information wants to be free, and freedom of biotech information is a double-edged sword. Thanks to a colourful band of hackers from governmental secret agencies to idealists and terrorists, biotech code has leaked from ethically sound laboratories to clandestine private and military laboratories which developed many horrifying applications. Bloody wars of the 20<sup>th</sup> century, such as the First and the Second World War, turned into 21<sup>st</sup> century wars marked by biotechnological ethnical cleansing of an unimaginable scale – whole nations have been wiped out, or deformed or left to slow death due to an inability to procreate. Yesterday's superpowers led by former Russia have launched a strong nuclear response to biotech weapons, significantly adding to the existing horrors and introducing new environmental nuclear-biotech challenges.

In the course of a few short years, our planet has dramatically deteriorated. Parts of the United Countries of America and Europe, parts of the United Countries of Northern Asia, and almost the whole of United Countries of Africa, are now uninhabitable; many other parts of the world, including some parts of our United Countries of South East Asia, suffer from serious environmental and human damages. Hundreds of millions have died, and billions live a life of ill-health and poverty. In the United Countries of South East Asia, due to the wisdom and foresight of our beloved leader Qiqiang Xing and other leaders of the Communist Party, we are now privileged to live in relative peace and safety. In 2070, our biotech world bears little resemblance to the relatively stable and often carefree digital world of our parents.

Military applications of biotech have been based on human primal instinct to conquer the other in a direct confrontation. Yet our Communist party, led by our beloved leader Qiqiang Xing, immediately understood that there is another, much slower but also much more powerful way of using biotech: improving human physical and mental abilities. Development of self-designed, faster-than-natural evolution of human beings can provide bioinformational advantage much stronger than

simple possession of better biotech weapons. Wise people, such as the famous 20<sup>th</sup> century physicist Stephen Hawking, understood this decades prior to our biotech revolution. In 1996, Hawking wrote:

Once such super humans appear, there are going to be major political problems, with the unimproved humans, who won't be able to compete. Presumably, they will die out, or become unimportant. Instead, there will be a race of self-designing beings, who are improving themselves at an ever-increasing rate. (Hawking, 1996)

While this race of self-designing beings is the only way to long-term winning and hopefully transcending the biotech wars, it has attracted much less attention and funding. It takes decades to bring up an improved human, and human beings do not grow up in labs. Furthermore, following development of improved humans has brought about many unintended consequences. Just like their early predecessor Dolly the Sheep, first generations of improved humans suffered from numerous illnesses which would suddenly appear sometime in their lives; many died prematurely, and in great pain, causing years of delay in research.

Unlike many barbaric superpowers which invested all their money and effort into biotech warfare, our wise leadership has always had a clear vision and a willingness to invest in human-designed, faster-than-natural evolution. After decades of devoted work, our scientists have finally achieved the dream of creating intellectually and physically superior humans with no known detrimental side effects. This research develops fast, and its limits are currently unknown. Yet, the current state of the art in faster-than-natural evolution of human beings technology indicates that the United Countries of South East Asia can now replace its whole human population, and hopefully the population of the whole world, by its wiser evolutionary successors.

Thanks to the unfettered wisdom of our divine leader Qiqiang Xing, today I have the honour and privilege to stand in front of you: the first generation of artificially evolved graduates in human history. Your intellectual and physical abilities surpass any naturally born human being. Right usage of these abilities, for the benefit of the United Countries of South East Asia and to our wise leader Qiqiang Xing, is the only hope for survival of the human race, or more precisely its improved successors, in our rapidly deteriorating world. You are our guiding light, our hope and our heroes. At this graduating ceremony, we give you our praise and gratitude, and put our hopes for a better world in your hands.

You graduated from the United Countries of South East Asia Military Academy, yet your mission is not at all connected with military pursuits. You are too valuable, and too few, to be lost in trivial conflicts such as fighting the barbarian forces such as the United Countries of America and Europe and the United Countries of North Asia. However, your task is even more heroic and even more self-sacrificing. Twenty-three years ago, when you were conceived in our laboratories, our biotech was much less developed than today. As I speak, our laboratories are producing a new generation of humans, even more capable than you are, and in much larger numbers. These new generations of humans are the future of the United Countries of South East Asia. But we, old-fashioned natural humans, are not able to educate these new generations. This daunting task waits for you first thing tomorrow morning.

You may ask, what is so daunting about educating a new generation? Should we not go straight into the battle against the barbarian threat of nuclear weapons from the United Countries of Northern Asia? Should we not develop stronger maritime forces that could finally take over the dominance of the United Countries of America and Europe over the world's oceans? Dear graduates, I hear your concerns. Warfare against these barbaric forces, which have no regards for the collective future of humanity and our planet, is the highest priority of the United Countries of South East Asia Military. However, this warfare is not your job because you were made for the hardest of all tasks.

It takes a hero to sacrifice one's life at the altar of the homeland. People such as Qiu Shaoyun and Li Wenliang gave us the most precious gift – they died, so that the rest of us could live a life worth living. But you need to dedicate your whole lives, and all the energies you can muster, to becoming a selfless step towards a better humanity. At this point in time, you are superior to us natural born humans; you can be on top of any duty you choose. Yet you are few and far in between, and your dominance over natural born humans would merely create a new form of inequality. Therefore, the Chinese Communist Party under the wise leadership of our beloved leader Qiqiang Xing has given you a different task. As new generations of artificially evolved human begins to grow in numbers, you will teach them how to make a better world. This job will bring an end to your superiority. Your students will outnumber you and outgrow your abilities. Your students will make decisions you are unable to understand. As you become obsolete, you will die out at the dawn of a new world that you will never enjoy.

Throughout history, the best teachers taught students who knew more than them. The ancient proverb says: 'If I have seen further, it is by standing upon the shoulders of giants'. Today, our bioinformational reality has given a new meaning to this statement. My generation, and your generation, now need to selflessly work ourselves into planned obsolescence and become mere steppingstones for a new evolutionary stage of human race. New world's citizens will be made, not born, and their intelligence will be nothing like we even imagined.

It is our sincere hope that these new generations will bring the suicidal global biotechnological and nuclear warfare to an end—either by dominating the enemy, or by sending current forms of warfare into obsolescence. But much before they grow up, these children will be surpassed by even superior generations. Today's warfare between countries will be replaced by tomorrow's struggles between evolutionary variants of human beings. While we hope that these struggles will be peaceful, history suggests that they could easily transform into new, currently unimaginable forms of warfare. You are the first generation of new evolutionary variants, and you will design the first generation of this inter-generational struggle. In this new context, current military knowledge based on thousands of years of experience offered by the United Countries of South East Asia Military Academy is at its best incomplete, and we can only hope that struggles of the future will be less cruel than struggles of the past.

I bring this graduation ceremony to an end, knowing that your rite of passage is not just yours – it is the rite of passage for the whole humankind, towards a very different conception of history. On this occasion, the customary saying that the future is in the hands of new generations is an understatement: literally and metaphorically. After all, we do not even know whether your students and their students will have hands, or they will be replaced by new, more sophisticated limbs. The human race is dead – long live the human race, in all its shapes and variants!

With this curious mix of poignant and hopeful thoughts, I welcome you, the first generation of graduates at the United Countries of South East Asia Military Academy, with one last request and a piece of advice. Treat us obsolete humans well, for the same obsolescence is on the cards for you and your successors.

General Fulin Zhang

Rector of the United Countries of South East Asia Military Academy

## Conclusion

Whilst this fun scenario set in Beijing on 15 June 2070 is a fictional one (and may not be the first in line for an Oscar), it still represents ‘if nothing else, a warning of what is now more possible’ (Kupferman, 2020b: 48). The fanciful nature of the narrative is based on accelerating scientific innovations in the here and now, including: ‘converging technologies stimulated by advances in four core fields: Nanotechnology, Biotechnology Information technology, and new technologies based in Cognitive science (NBIC)’ (Bainbridge and Roco, 2006: 1; Peters et al., 2021c). There is a global convergence taking place which ‘constitutes a major phase change in the nature of science and technology, with the greatest possible implications for the economy, society, and culture’ (Bainbridge and Roco, 2006: 2). Furthermore, ‘of the four NBIC fields, cognitive science is the least mature, but for this very reason, it holds very great promise. This is a multidisciplinary convergence of cognitive and perceptual psychology, linguistics, cultural anthropology, neuroscience, and artificial intelligence aspects of computer science’ (Bainbridge and Roco, 2006: 4) which has all kinds of implications for questions concerning the human body and mind and therefore for human physical and mental health, as we collectively emerge from a global pandemic.

The COVID-19 crisis is currently (and understandably) dominating various worldwide activities, including education, but also somewhat obscuring the larger ecosystem of crises that are facing humanity alongside. In the background to the current complex, geographical, economic and scientific vaccine negotiations, the scattered nature of existing biodigital research leaves us wondering how this will soon intersperse with global recovery and potentially lead to an even bigger cultural shift than the pandemic, in the not-too-distant future. Therefore, as we conclude with an analysis of some questions we might use to address such a future, we contemplate the sorts of outcomes that might result.

Whilst new generations of artificially evolved humans may seem beyond comprehension, when so much of our survival seems to depend right now on vaccination, there are bigger questions than simply *when* in the future such developments might become possible. For example, *Why should a fictional account of the future like the one outlined above disturb its readers?* One reason to speculate about this concerns human history. As humans, we have come to believe that the future (as well as the present) has a history. We relate this history to an association that we believe exists (and continually progresses) between science and society. Therefore, we may look back at literature that was written in the past and argue that it was inadequate and lacking in some way, or perhaps that it was visionary in its nature, because it somehow predicted a route that humanity has actually taken. Duarte and Krause-Jensen (2020) argue that ‘150 years ago, Jules Verne formulated a vision for technological advances propelling ocean exploration and exploitation of resources within the carrying capacities of marine ecosystems, but he also projected the pathway leading to today’s overexploitation of resources’. They therefore look to ‘build on the novel’s prophecies to consider steps conducive to a sustainable ocean economy’ (Duarte and Krause-Jensen, 2020).

Yet on the other hand, Bowler (2021) suggests in *Progress Unchained* that we are now witnessing the demise of the old ‘chain of being’ where humans have treated progress like a ladder to reach a goal, such as is described by Duarte and Krause-Jensen. A linear model of progress, as a built-in historical trend that might produce benefits that humans currently value, is being altered by unpredictable new routes that technology is taking. As such, ‘imagining a utopia does not require a theory of historical progress’ (Bowler, 2021: 1). Also other models of progress, such as the circular model championed by Muhammad Ibn Khaldun (2015) [1337], are getting renewed attention (Jandrić 2017: Chap. 5). Yet, given that utopias are generally critiques of an existing state of affairs,

we may ask: *Doesn't such an 'unchaining' lead to some deep and penetrating existential questions for humans, ones that education can no longer overlook in a postdigital–biodigital society?*

Whilst contemplating a future where a much more open-ended notion of progress might emerge, we have to ask: *What would the nature of critique look like under these circumstances?* With no history (scientific or educational) to pin this to, it may be short-lived or maybe no longer an issue, in which case there are significant disciplinary questions that follow. For example, *would many subjects that people currently study disappear and would new ones replace these?* Before heading too far in that direction though, we might pause to consider whether progress would even be unified across countries, as even now 'in today's globalised world, it is by no means certain that all nations are evolving in the same direction' (Bowler, 2021: 5). In our fictional future, the made-not-born graduates were expected to teach others who would become superior to them. In this new cultural context, we would then likely shift away from current Equality, Diversity and Inclusivity (EDI) agendas knowing that these would cease to matter. On this basis, we might ask then, *why would we require any written policies to be produced to support equality of opportunity? If subsequent students will make decisions that their teachers are unable to understand then how can planning (or responsibility) take place for future generations?*

These are just some of the immediate questions that spring to mind as we imagine what planned obsolescence could actually await us as part of a wider cultural shift in how we relate to our own human history, stories and memories. This can take us also on an imaginative journey to consider what would (or would not) be a desirable evolutionary stage of the human race. For example, *does freedom of thought and speech remain a democratic good?* Would it remain an indispensable human value that might guide future debates over the uses and applications of cognitive technologies (Sententia, 2006: 153)? This is another aspect of our biotech future carrying new educational challenges that we might debate in the light of our contemporary anxieties.

A further question we might ask, as we contemplate our future in 2070, is: *Would we be so intent on measuring so much in education, if human history was no longer relevant?* As we contemplate the future, we tend to think of it as a political space, but the politics that we are currently negotiating are based on historical events and could have changed beyond recognition in 2070. The economic structures that have shaped our educational institutions over many decades have a much longer background in globalisation and modernity. Our closely interconnected economic, political and cultural conflicts have taken us through crises of capitalism and into the neoliberal frameworks that have shaped recent decades of public policy. These have been heavily critiqued for standardisation, benchmarking, audit culture (Shore and Wright, 1999) and a heavily outcomes-focused policy discourse, that linguistically fails to attribute labour to humans (Hayes, 2019).

Yet, questions can now be raised concerning what effects a shift from our current political economic discourse might have if we were to contemplate instead a political bioeconomic discourse (Peters et al., 2021c). *Would such a shift brought about by biotech alter our discourse and behaviours to yield a more equitable future? Or might we be approaching forms of self-improvement that simply eliminate what has gone before?* Returning to the present, there is a role for postdigital education in a biotech future that approaches quickly. There is a need to build dialogue across the different disciplines, jargons and methodologies and further postdigital–biodigital research and policy in education, within ethical frameworks that allow sustainable human development and its just distribution across the human race.



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## ORCID iD

Petar Jandrić  <https://orcid.org/0000-0002-6464-4142>

## Notes

1. Williamson, Pickersgill, and Torday have just started a project, 'The rise of data-intensive biology in education', funded by the Leverhulme Trust (see [Williamson 2020](#)).

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## Author Biographies

**Petar Jandrić** is Professor at the Zagreb University of Applied Sciences, Croatia, and Visiting Professor at the University of Wolverhampton, UK. Petar's research interests are at the post-disciplinary intersections between technologies, pedagogies, and the society, and research methodologies of his choice are inter-, trans-, and antidisciplinarity. He is the Editor-in-Chief of *Postdigital Science and Education* journal <https://www.springer.com/journal/42438> and book series <https://www.springer.com/series/16439>. His recent books include *Postdigital Dialogues on Critical Pedagogy, Liberation Theology and Information Technology* (2020), *Knowledge Socialism. The Rise of Peer Production: Collegiality, Collaboration, and Collective Intelligence* (2020), and *The Methodology and Philosophy of Collective Writing* (2021). Personal website: <http://petarjandric.com/>.

**Sarah Hayesis** is Professor of Higher Education Policy in the Education Observatory at the University of Wolverhampton, UK. Previously Sarah worked at Aston University, where she led programmes in Education and Sociology and is now an Honorary Professor. Sarah has also taught at the University of Worcester, at international partner institutions, and has led a range of research projects. Sarah's research spans sociology, education and policy, technological and social change and she has published in a variety of related journals. Her recent books include *The Labour of Words in Higher Education: Is it Time to Reoccupy Policy?* (2019) and *Postdigital Positionality: Developing Powerful Inclusive Narratives for Learning, Teaching, Research and Policy in Higher Education* (2021). Sarah is an Associate Editor for *Postdigital Science and Education* (Springer). Personal website: <https://researchers.wlv.ac.uk/sarah.hayes>.