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Universities 4.0 Discussion Paper

Universities of the Future

Adaptation and Transformation to Better Serve the Global Community

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Introduction

Contemporary universities face the need to respond to a wide range of internal and external pressures. These include changing student demographics, cost pressures, evolving stakeholder demands and the rapid and ubiquitous nature of technological change. The COVID-19 pandemic has accelerated many of the trends already underway, including a reset in the global economy, shifting geopolitics, the rise of the education technology industry and digital transformation. These major shifts have led to questions around the role of the university in contemporary society. Some commentary suggests that the most recent social and technological shifts threaten the relevance or indeed survival of the university.[1] However, the institution's 800-year history provides solid evidence of its adaptability and capacity to evolve in response to shifting circumstances and opportunities.

Despite the recent turmoil wrought by the global pandemic, higher education has proved remarkably resilient. While the pandemic has legitimized the role of online education, students and faculty have reinforced the importance and value of direct interaction and the stimulating effect of a relational based higher education system. The pandemic has also underscored the huge contribution of global research and science, the critical importance of collaboration and the significant potential for higher education to contribute to tackling other major societal issues such as climate change.

While the survival of the university appears secure, there are strong arguments for the need to transform, adapt and innovate. Economic headwinds and looming challenges such as climate change highlight the importance of affirming higher education's value and role in society. The pandemic has amplified calls by government for universities to demonstrate higher education's value, social impact and community leadership. Universities will need to prove how they add distinctive value by producing talented graduates, promoting innovation, and developing productive, reciprocal relationships with their communities.[2] COVID-19 has resulted in various permutations of hybrid teaching and learning being woven into everyday life and continues to reshape the operational models and expectations of the tertiary education sector. As a result, the sector will be looking to refresh core academic activities and explore innovative new modes of operation. Diverse models will ensure universities not only remain relevant, but will be positioned to take a leading role in helping society understand, navigate and shape the future.

This discussion paper outlines the drivers of change and related uncertainties facing contemporary universities as well as the opportunities for universities to adapt, respond and innovate in response to major societal shifts. The paper examines potential risks and explores how the university, in many forms, might navigate a rapidly shifting landscape and the potential impacts on the fundamental character and values of the university. It then poses a series of questions to explore these dynamics.

Shifting Demographics, Growth in Social Mobility

The massification of higher education across the globe has led to tertiary education no longer being the preserve of the elite.[3] The rapidly expanding middle class in many countries has fueled demand for higher education, leading to a dramatic increase in student mobility, transnational and online education.[4] The typical student profile is changing. There has been a fall in residential full-time students living away from home, a rise in part-time and mature-age students, and an increase in the number of accelerated degrees and those taking specific modules at university rather than completing a full degree at one university.[5] In response to consumer and employer demand, there is growing pressure on universities to develop more vocationally oriented degrees with a greater focus on employability and graduate outcomes.[6] There is also a more conscious focus on universities in both teaching and research as drivers of innovation and economic transformation. These trends have been further accentuated by the COVID-19 pandemic.

1 Fischetti (2019). The Three Things Universities Must Do to Survive Disruption. Retrieved from: https://theconversation.com/the-three-things-universities-must-do-to-survive-disruption-117970.

2 Coates, H., Xie, Z., & Hong, X. (2020). Engaging transformed fundamentals to design global hybrid higher education. Studies in Higher Education, 1-11.

3 Altbach, P.G. (2016), Global perspectives on higher education, Baltimore: JHU Press.

4 Tremblay, K., Lalancette, D., & Roseveare, D. (2012). Assessment of higher education learning outcomes: Feasibility study report, volume 1 design and implementation. *Paris, France: Organisation for Economic Co-operation and Development*.

5 Seldon, A., & Abidoye, O. (2018). *The fourth education revolution*. Legend Press Ltd.

6 Clarke, M. (2018). Rethinking graduate employability: The role of capital, individual attributes and context. *Studies in Higher Education*, 43(11), 1923-1937.

New modes of delivery have emerged in response to shifting demographics and growing demand. Rather than attending a single institution, students now receive credit in multiple ways, including from dual-degree programs, polytechnics, online providers, and multiple universities.[7] Traditional boundaries are blurring between professional development, occupational credentialing, and formal higher education.[8] New forms of learning are expanding access to tertiary education and allowing learning to be more aligned with workplace requirements and the demands of employers. Personalisation and flexible pathways are opening up opportunities to disadvantaged students.[9]

However, there are concerns that rather than tackle inequities, new modes of tertiary education may perpetuate disadvantage resulting in a differentiated system where the privileged have access to face to face teaching, pastoral support, a research-rich environment, and extracurricular activities, while those with lesser opportunity will be left with the support of machines and algorithms. Moreover, there are fears that not all qualifications will be equally valued and recognised by employers resulting in a two-tier system.[10,11] The impact of COVID-19, which has served to further exacerbate existing inequalities, is yet to be fully understood.[12]

Technological Disruption

Society's capacity to generate and absorb new technologies is growing at an exponential pace. We have much greater access to information and tools to collect, transmit and process information than previous generations. The Internet is now the dominant infrastructure for knowledge and information, both as a repository and as a global platform for knowledge exchange between people.[13] Technologies such as Artificial Intelligence (AI), blockchain, and digitisation promise to transform higher education but not without risk.[14]

Concerns around equity and ethics have arisen as well as caution over the real benefits of much hyped new technologies. Prior to COVID, universities were already grappling with how to manage the adoption and integration of new technologies in ways that ensure enhanced efficiencies and improved pedagogical outcomes while at the same time limit any negative impact or unintended consequences. However, the pandemic has temporarily halted the debate on the merits or otherwise of online learning due to the immediacy and urgency of the situation. The almost instantaneous shift to online learning resulting from campus lockdowns has been described as one of the biggest changes ever to impact education with an estimated 90 per cent of all learners globally studying from home.[15]

Before COVID-19, many institutions had begun embracing emerging technologies as a way of reducing administration, cutting costs, and improving security.[16] Proponents argue that technology can support a greater personalisation of education, allowing students to have a higher degree of control over their own learning in terms of the context, mode, and timing.[17,18] New technologies such as gamification can lead to increased student engagement while augmented and virtual reality has the potential to transform teaching and learning. For example, the use of AI tutors has been embedded for several years at Georgia Tech.[19]

The arrival of new technologies has the potential to widen access and participation and improve the consistency

7 Mintz, S. (2013). The future is now: 15 innovations to watch for. *The Chronicle of Higher Education*.

8 Gallagher (2016). From micromasters to nanodegrees. Retrieved from: https://www.universityworldnews.com/post.php?story=20160809133730588.

9 Fishman, T. D., Ludgate, A., & Tutak, J. (2017). Success by design: Improving outcomes in American higher education. *Deloitte Insights*.

10 Czerniewicz, L. (2017). Unbundling and rebundling higher education in an age of inequality. *Educause Review*. Retrieved from https://er. educause. edu/articles/2018/10/unbundling-and-rebundling-higher-education-in-an-age-of-inequality.

11 McCowan, T. (2017). Higher education, unbundling, and the end of the university as we know it. *Oxford Review of Education*, 43(6), 733-748.

12 Marinoni, G., Van't Land, H., & Jensen, T. (2020). The impact of COVID-19 on higher education around the world. *IAU Global Survey Report*.

13 Moscardini, A. O., Strachan, R., & Vlasova, T. (2020). The role of universities in modern society. *Studies in Higher Education*, 1-19.

14 Parker, S., & Edwards, D. (2018). Accelerating university transformation. Retrieved from https://home.kpmg/au/en/home/insights/2018/02/accelerating-university-transformation.html.

15 WEF. (2020). How COVID-19 is driving a long-overdue revolution in education. Retrieved from https://www.weforum.org/agenda/2020/05/how-covid-19-is-sparking-a-revolution-in-higher-education/.

16 Parker, S., & Edwards, D. (2018). Accelerating university transformation. Retrieved from https://home.kpmg/au/en/home/insights/2018/02/accelerating-university-transformation.html.

17 Davies, S., Mullan, J., & Feldman, P. (2017). *Rebooting learning for the digital age: What next for technology-enhanced higher education?*(pp. 49-50). Oxford, UK: Higher Education Policy Institute.

18 KPMG (2020). The future of higher education in a disruptive world. Retrieved from https://assets.kpmg/content/dam/kpmg/xx/pdf/2020/10/future-of-higher-education.pdf.

19 Goel, A. K., & Polepeddi, L. (2016). *Jill Watson: A virtual teaching assistant for online education*. Georgia Institute of Technology.

of education provision.[20] Proponents argue that technology increases student engagement and reduces dropout rates. Digital assistants can provide one-on-one learning support not possible for lecturers with 500 students. Student engagement in online learning is enhanced via higher levels of interaction through collaborative learning, gamification, and immersive learning environments.[21] However, the growth in technology, MOOCS, and other forms of online education do not automatically lead to a reduction in inequalities. Poor quality learning experiences and low recognition of online qualifications may result in inequities persisting. Gains in personalisation may be offset by a loss of relational aspects of learning, opportunities for dialogue, and broader experiential learning.[22]

COVID-19 has both accelerated the adoption of new technology and highlighted some of the shortcomings of online education. The pandemic has heightened inequities already apparent in higher education with students from disadvantaged backgrounds often lacking access to technology and infrastructure.[23] Some believe the growth in online and blended modes of higher education threatens the holistic concept of learning which includes cultural, sport, political and vocational development. While flexibility can result in greater convenience and mobility, it can also result in an incoherent and fragmented learning experience, made difficult to access for those without cultural capital.[24]

In sum, equity issues loom large. Redistributing opportunity at scale requires a significant retooling of our digital environment and skills development to address disadvantage, irrespective of the diverse modes of learning that will characterise the university of the future.

Financial Pressure and the Rise of "Unbundling"

Linked to advances in technology and financial pressures facing the tertiary sector, is the growing trend towards "unbundling." Reduced state support for higher education in many national contexts coupled with the accelerating cost of institutional operations has placed financial pressures on many institutions. Increasingly, institutions are under pressure to do more with less resulting in many institutions resorting to "unbundling;" a process of disaggregating educational provision into its component parts, often with external providers.[25] Proponents of unbundling note that offering low-cost models of higher education opens higher education opportunities to populations that have previously lacked access. However, there are also risks associated with limited pedagogical interaction, access to resources, and enrichment activities associated with broader campus life.[26] Moreover, the students who enroll in lower-cost, blended modes of delivery may lack the social capital to successfully navigate the higher education landscape with the limited support that a "no-frills" education offers.

The separating out of the diverse offerings of a university also has implications for research. Elite universities are likely to remain unchanged.[27] Strong interest in rankings strengthens the case for the traditional campus bringing together elite research, teaching, extracurricular activities, and graduate studies. However, less prestigious institutions are likely to look to lower costs by discontinuing offerings that do not provide them with a point of differentiation in an increasingly crowded higher education market. This can lead to positive outcomes with institutions focusing on areas of teaching and research that will drive their competitive advantage.

In terms of research, this may mean focusing on core strengths and building up programs where the institution has a natural advantage. The result can be positive with gains in research productivity, the new lines of inquiry being discovered, and institutions with limited resources assuming leadership roles in new disciplinary fields.[28] However, there is also the

20 Larsson, 2019 https://www.theguardian.com/education/2019/apr/17/its-an-educational-revolution-how-ai-is-transforming-university-life.

21 Christopoulos, A., Conrad, M., & Shukla, M. (2018). Increasing student engagement through virtual interactions: How?. *Virtual Reality*, 22(4), 353-369.

22 McCowan, T. (2017). Higher education, unbundling, and the end of the university as we know it. *Oxford Review of Education*, 43(6), 733-748.

23 Czerniewicz, L., Agherdien, N., Badenhorst, J., Belluigi, D., Chambers, T., Chili, M., ... & Ivala, E. (2020). A Wake-Up Call: Equity, Inequality and COVID-19 Emergency Remote Teaching and Learning. *Postdigital Science and Education*, 2(3), 946-967.

24 McCowan, T. (2017). Higher education, unbundling, and the end of the university as we know it. *Oxford Review of Education*, 43(6), 733-748.

25 Czerniewicz, L. (2017). Unbundling and rebundling higher education in an age of inequality. *Educause Review*. Retrieved from https://er. educause. edu/articles/2018/10/unbundling-and-rebundling-higher-education-in-an-age-of-inequality.

26 McCowan, T. (2017). Higher education, unbundling, and the end of the university as we know it. *Oxford Review of Education*, 43(6), 733-748.

27 Marginson, S. (2016). The worldwide trend to high participation higher education: Dynamics of social stratification in inclusive systems. *Higher Education*, 72(4), 413-434.

28 Gilbert, C. G., Crow, M. M., & Anderson, D. (2018). Design thinking for higher education. *Stanford Social Innovation Review*. Retrieved October, 12, 2018.

risk of reducing the breadth and diversity to which comprehensive institutions are deeply committed at a time when interdisciplinary collaboration is required to address the "grand challenges" facing society.[29,30] The value of interdisciplinary research has been showcased during the pandemic with experts from a wide range of disciplines working on the COVID-19 response. By maintaining a breadth of disciplines, universities are home to the intersection of ideas that offer the most profound opportunity to address global issues such as climate, sustainable development, and global inequality in resources and opportunity.

While encouraging institutions to focus on their strengths may be viewed as a positive outcome of resource rationalisation, there are also risks in the separation of the primary functions of teaching and research into distinct institutions, or dividing of these tasks between different staff members. This can result in a loss of synergies between diverse elements of universities, including teaching, research, and community engagement, and also between different disciplines.[31]

The "Porous" University

The pandemic has amplified predicted calls by government for universities to demonstrate educational value, social impact, and community leadership.[32] Universities are expected to be more accessible and responsive to the communities they serve, a result of the ongoing debate around the value of universities and what they bring to society that has been accelerated by COVID-19.[33] Institutions are expected to lead by example. For instance, the impact of climate change has put pressure on universities to become carbon neutral in their operations. Universities are under pressure to justify their role and demonstrate the broad benefits they provide. There is a greater emphasis on co-creation and the dissemination of knowledge within and beyond academia, drawing on open and responsive work practices such as design-thinking, co-design, and co-production.

Greater accountability can have positive ramifications. It can result in universities having a more nuanced understanding of the issues that are important to the community, being more responsive, and leading to greater collaboration. The benefits include researchers, students, industry, and other stakeholders working together on "real-world" problems and developing important two-way relationships. Transdisciplinary research, which combines disciplinary knowledge with that of public and private sector stakeholders and citizens to address complex societal challenges, is being actively promoted by institutions. This includes developing effective responses in acute crises, such as the COVID-19 pandemic, as well as finding longer-term solutions for sustainability development.[34] Importantly, COVID-19 has reinforced the value of universities, underscoring the huge contribution of global research and science, the critical importance of collaboration, and the significant potential for higher education to contribute to tackling other major societal issues.

Despite the recognition that universities need to be more responsive to their communities, there are also strong arguments for retaining some distance from the immediate and pressing concerns of a wide range of stakeholders. Universities need to retain some autonomy, away from the immediate priorities of government, industry, and other stakeholders to foster ground-breaking science and innovation.[35] A focus on immediate results and impact from research can discourage creativity, marginalise certain disciplines and result in a devaluing of curiosity driven research and its potential long-term benefits to society. Universities also have an important role in society as an independent and trusted critical voice.

Collaborative, Technology-Driven Research

A defining characteristic of the comprehensive university is that learning takes place in an intellectually broad research-informed environment and that this type of education is of intrinsic value

29 Cawood, R., Roche, J., Ong, A., Sharma, D., Mulder, A., Jones, L., ... & Kirkhope, J. (2018). Can the universities of today lead learning for tomorrow? The University of the Future. *Ernst & Young Australia*.

30 Pohl, C., Truffer, B., & Hirsch Hadorn, G. (2017). Addressing wicked problems through transdisciplinary research. *The Oxford handbook of interdisciplinarity*, 319-331.

31 McCowan, T. (2017). Higher education, unbundling, and the end of the university as we know it. *Oxford Review of Education*, 43(6), 733-748.

32 Coates, H., Xie, Z., & Hong, X. (2020). Engaging transformed fundamentals to design global hybrid higher education. *Studies in Higher Education*, 1-11.

33 Cawood, R., Roche, J., Ong, A., Sharma, D., Mulder, A., Jones, L., ... & Kirkhope, J. (2018). Can the universities of today lead learning for tomorrow? The University of the Future. *Ernst & Young Australia*.

34 OECD (2020), *How has private expenditure on tertiary education evolved over time and how does it affect participation in education?*, Education Indicators in Focus, No. 72, Paris: OECD Publishing. https://doi.org/10.1787/6b7ded53-en.

35 McCowan, T. (2017). Higher education, unbundling, and the end of the university as we know it. *Oxford Review of Education*, 43(6), 733-748.

to society in the quality and breadth of people it generates. New digital technologies such AI, virtual laboratories, modeling, simulation, and data analysis and mining offer the potential to transform the research environment that underpins this model.

The collective and global nature of research has been highlighted during the pandemic with researchers creating at least three viable vaccines in less than a year through an unprecedented international science collaboration between universities and industry.[36] The move of leading publishing houses to rapid publication and open access articles represents a new international model for research collaboration. This rapid exchange of information has allowed an international effort to both understand the nature of the disease and expedite the development of a vaccine. This type of collaboration also raises questions around the benefits, risks, and future role of "open science" in accelerating the rate of scientific inquiry across the globe.[37]

Technology has the potential to further strengthen and enhance collaborative research. Virtual Labs and Collaborative Research Platforms allow researchers to collaborate with colleagues in other research institutions around the world and across research disciplines. AI-based search tools such as Iris.ai can help researchers filter, rank, and group search results of thousands of research publications. AI algorithms are now capable of making new scientific discoveries by bringing together text mining, visualization, and analytics to extract facts and propose new hypotheses that are likely to be true.[38] The automation of some aspects of scientific research will potentially provide researchers with more time to focus on higher-order tasks. New technology offers significant potential to promote internal and external collaboration and maximise research efficacy.

Greater collaboration between universities, public research institutes, and industry is considered fundamental to fostering innovative, ground-breaking research urgently needed to tackle major global challenges. For example, higher education has a critical role to play in addressing the UN Sustainable Development Goals. Universities can both equip the next generation with skills, knowledge, and understanding to address sustainability challenges and opportunities, and perform research that drives innovation and advances the sustainable development agenda. In developing countries, digital innovation allows universities to share costs and pool resources via shared digital libraries and digital communication facilities that help connect institutions and form transnational research clusters.[39]

As we emerge from the COVID-19 pandemic, research and innovation will be central to a green and inclusive economic recovery. Universities are uniquely placed to provide the innovation needed to catalyse a more knowledge-rich economy and generate the productivity gains that are essential to addressing some of the more pressing social and wealth inequality issues faced by our communities. An innovation-led recovery will require upgrading the research and innovation ecosystem in many jurisdictions, and building deep networks between industry, researchers, and government.[40] Researchers, innovators, and the pipeline of highly educated graduates will be central to the COVID-19 rebuild. The challenge will be that this contribution will be sought from Universities at a time when in many parts of the world their economic model is facing massive upheaval.

Conclusion

The challenge facing universities is to navigate the contemporary developments in higher education, adapting and responding to changes, without losing sight of their core purpose. Universities are under pressure to become more innovative, responsive, efficient, and accessible. Many universities will need to make choices by investing in areas that will reposition their core teaching and research and build on their strengths to remain relevant and avoid mediocrity. Meanwhile, there is potential for completely new operating models to emerge that are capital investment light and technology heavy but offer a more societally responsive mode of engagement and delivery.

New technologies offer enormous potential to strengthen research performance, enhance teaching and learning and expand access to higher education.

36 United Nations (2020), "Scientists optimistic about COVID-19 vaccines for all," accessed December 14 2020 at https://news.un.org/en/story/2020/12/1079322.

37 Howe, A., Howe, M., Kaleita, A. L., & Raman, D. R. (2017). Imagining tomorrow's university in an era of open science. *F1000Research*, 6, 405. doi:10.12688/f1000research.11232.2.

38 Extance, A. (2018). How AI technology can tame the scientific literature. Retrieved from: https://www.nature.com/articles/d41586-018-06617-5.

39 Trines, S (2018). Educating the Masses: The Rise of Online Education in Sub-Saharan Africa and South Asia. *WENR*, August 14. Retrieved from https://wenr.wes.org/2018/08/educating-the-masses-the-rise-of-online-education.

40 Productivity Commission (2020). New Zealand firms: reaching for the frontier. Retrieved from https://www.productivity.govt.nz/inquiries/frontier-firms/.

COVID-19 has highlighted both the benefits of technology but has also revealed gaps in regulation and quality assurance, highlighting the importance of universities bolstering their commercial governance capabilities.[41] There are complex questions around online education and equity and the increasingly pervasive public-private partnership. Will new technologies lessen or exacerbate existing inequities? What are the broader implications of the increasingly vocational focus of many credentials? There are also ethical issues to consider including which data is collected, who is responsible for processing it, and for what purpose.

The push for universities to become more "porous" and closely aligned with industry, government, and other stakeholders also raise questions.[42] Will calls for greater integration lead to business, industry, and government having too much influence over research, prioritising short-term results, subverting academic integrity, and diminishing respect for the humanities and social sciences?

The arrival of for-profit providers and the growth in "unbundling" promises greater efficiencies and scope for the higher education sector to expand under a sustainable funding base. The benefits include widening access and offering greater flexibility and relevancy to an increasingly diverse student cohort. However, it also raises questions about the nature and purpose of the university and the underpinning core values. As universities adopt new technologies and reinvigorate core activities, their challenge is to bring about transformation in ways that promote genuine innovation, address widespread and persistent inequalities. How universities respond and adapt to these major societal shifts and accompanying demands and expectations will be critical in shaping community perceptions and attitudes towards higher education.

Discussion Questions

1. Are we likely to see a differentiated sector where traditional "comprehensive" universities marketing a premium experience diverge from commodity skills providers? The latter may not offer bricks and mortar at all but be based around remote delivery of customised modules/micro-credentials. In many jurisdictions a University is defined in law, but there is increasing pressure to loosen definitions in response to the democratisation of higher education. This also challenges the degree or diploma and the graduate as the basic educational output units.
2. Will these new entities be engaged in research? In a platform driven world (both teaching delivery and research) this is not precluded by the absence of a traditional campus if scholarship and collaboration can be supported through technology platforms.
3. Will graduate engagement in innovation and entrepreneurship become a central requirement, particularly for the technology driven institutions as a vehicle to more "society ready" graduates?
4. Which technologies offer a genuine opportunity to transform the learning experience and research environment? How do these match with and respond to changing stakeholder demands? For example, can augmented reality and 3D virtual learning environments enrich the graduate experience and enhance employability?
5. Which new models are best placed to address global inequities in higher education and widen access to research informed learning at an affordable cost? How can online models offer rich, high quality learning experiences and avoid the recolonization of the academic space in developing regions?

41 Coates, H., Xie, Z., & Hong, X. (2020). Engaging transformed fundamentals to design global hybrid higher education. *Studies in Higher Education*, 1-11.

42 Feenberg, A. (2017). The online education controversy and the future of the university. *Foundations of Science*, 22(2), 363-371.

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