

Lecture Notes in Educational Technology

Christina Hong
Will W. K. Ma *Editors*

Applied Degree Education and the Shape of Things to Come

 Springer

Lecture Notes in Educational Technology

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Christina Hong · Will W. K. Ma
Editors

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Preface

This edited volume seeks to evolve a global community of practice to share case studies, engage in critical discussion and spearhead thought leadership to address the paradigm shift in next generation educational practice.

Whereas Education 4.0 refers to the shifts in the education sector in response to Industry 4.0 where digital transformation has impacted the ways in which the world of work and our everyday lives are becoming increasingly automated. In the applied degree sector, change and transformation is occurring as leaders, educators, start-ups and industry partners collaborate in more integrated and mutually beneficial ways to co-create opportunities for skilling and reskilling for the benefit of the circular economy.

The use of advanced technologies and Ai is enabling students and academics working in close collaboration with industries and tech start-ups to engage in collaborative applied research to posit project-based learning with a focus on problem-solving for value-creation. While digitalization and workforce re/skilling has been a recent catch-cry, an emergent focus on the interrelationship between humans and technology in the workplace and learning experiences that foster the enduring capabilities of human-workers such as creativity, imagination, empathy, resilience, adaptive thinking and social intelligence are coming to the fore.

The call for papers began in January 2022. The theme of the call is “Applied Degree Education: The Shape of Things to Come.” We received 43 papers from a variety of areas, such as Mainland China, Ecuador, Germany, Hong Kong, India, Macau, New Zealand, Singapore, the United Kingdom, etc. Following a double-blind review, 18 papers were chosen for inclusion in this edited edition. They were divided into four major categories: Part I: New Realities: Blended Learning, Hybrid Learning, Virtual Learning, and Technology-Enhanced Learning; Part II: Human Touch: Knowledge, Skills, and the Future of Education; Part III: Learner Transformation: Active Learning, Deep Learning, Engagement, and Student Success; and Part IV: Higher Education Ecosystem.

We value the contributions of all authors, including those who were chosen and those who were not. We appreciate their time and effort in preparing the entries. This contributes to the success of the volume being edited.

We wish to convey our gratitude to the International Programme Committee for their time and effort in reviewing the papers. This crucial phase helps maintain the work's quality and the volume's central theme.

The COVID-19 epidemic still affects the entire globe. In these trying times, it is even more important to discuss the future of education. We hope that this initiative will create a forum for international academics and practitioners to share their knowledge, discoveries, and ideas for a better future.

Brisbane, Queensland, Australia
Hong Kong, China
December 2022

Prof. Dr. Christina Hong
Prof. Dr. Will W. K. Ma

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Prof. Dr. Will W. K. Ma Ph.D. is currently a Professor of Teaching and Learning, at Tung Wah College. Prior to this, he was the Head of the Learning Commons and Digital Innovation at the Technological and Higher Education Institute of Hong Kong (THEi), where he was responsible for providing physical learning space, information technology services, and physical and online learning resources to staff and students in order to promote applied research and enhance learning. He was also the

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Chapter 1

Applied Education Futures and the Shape of Things to Come



Christina Hong

Abstract Skills development across industry and professional sectors is identified as one of the essential drivers of recovery and growth to address the fragility and volatility of post-COVID economies. The window of opportunity for the applied degree sector, to rethink, reset, and ride the skilling and reform agenda to help accelerate economic recovery, business transformation, enhance digital skilling and competences to enable sustainable transformation is in play. This chapter highlights the emergent smart education approaches, intelligent technologies, and opportunities that may be considered critical and transformational in future-shaping a more sustainable, value-added, applied degree sector.

Keywords Applied education and future skills · Smart education · Sustainability · Industry 5.0 · Education 5.0 · Intelligent and immersive technologies · Lifelong learning

1.1 Introduction

The world is currently undergoing some of the most significant socio-economic shifts in history, including labor shortages, the so-called *big resignation*, a transition to hybrid work models, a rise in geopolitical tensions amid resurgent nationalism aka new nationalism, and the ubiquitous expansion of digitalization and automation. Innovations in technology are profoundly altering the way we operate. As economies emerge out of the pandemic and transition to the next normal, there is an increasing focus on planning for and implementing reforms across multiple sectors and jurisdictions, including across post-secondary tertiary education. As governments rethink, refocus, and seek to deliver the workforce skills deemed necessary to aid economic recovery, both immediately and into the long-term future, the professionally and vocationally orientated applied degree and sub-degree sectors are being critically positioned as change drivers.

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1.2 Future Skills Powering Post-COVID Economic Recovery

Skills it seems is the ‘new black’. As economies gear-up, re-establish and look to accelerate in the wake of COVID-19, the demand for a highly skilled and technologically adept workforce is expected to increase significantly. Countries around the globe are convening ‘Skills Summits’ that bring together business, government and related stakeholders including the tertiary education sector, with a focus on exploring and determining how this crucial acceleration of skills may be promulgated. Such Summits are addressing the requisite shifts in policy gearing necessary to support such acceleration. Skills development across industry and professional sectors is identified as one of the essential drivers of recovery and growth to address the fragility and volatility of post-COVID economies. Concomitant with this, is the desire to rebuild and reshape workforce needs both now and into the foreseeable future. As part of this endeavor, Governments are also seeking to redress the imbalance wrought by the skills mismatch and skills shortages in many workforce sectors (Hong, 2022).

The first *World Economic Forum (WEF) Jobs Reset Summit: Post-Pandemic growth needs new skills for new jobs that are open to all* held in October 2020, launched public–private collaborations to mobilise job creation and skills development to shape a new agenda for growth, skills, and equity. The Summit was designed around four pillars: (1) economic growth, revival, and transformation; (2) work, wages, and job creation; (3) education, skills, and lifelong learning; and (4) equity, inclusion, and social justice. The WEF’s *Future of Jobs Report (2020)*, released during the Summit, highlighted the ‘double disruption’ faced by workers in the face of the pandemic recession, coupled with accelerated automation. The second *Jobs Reset Summit* held in June 2021, highlighted that the equivalent of 255 million fulltime jobs across the global workforce were ‘lost’ in 2020, and again sought to accelerate investment towards the reskilling and upskilling of workers and the imperative to plan for global jobs recovery. The Summit looked particularly at areas of new jobs growth, such as in the area of new tech-enabled jobs, where 150 million jobs are expected to be created over the next five-years. As the examples in the following section will indicate, countries around the globe also continue to pursue discussion at the highest levels, positioning economic recovery via skills agendas.

In recent years, China has actively promulgated successive plans for national technical and vocational education and training (TVET) reform to deliver the skills needed for a modern, digital, postindustrial economy, including, setting national standards, and deepening the integration with industries. The Chinese government released a five-year blueprint in August 2021, to boost employment and further expand the vocational education system to drive domestic demand and upgrade industry. This blueprint, identifies steps to address the gap between the demand and supply of skilled workers comes in addition to a plan previously set in 2019, which placed workforce upskilling at the core of its reform agenda.

The United Kingdom (UK) hosted an international skills summit in May 2021, bringing together a range of countries, to share experiences and learnings on how higher technical skills are, for example, powering advanced manufacturing and delivering zero carbon. The Government of Columbia together with the Organization for Economic and Co-operation and Development (OECD) hosted a Skills Summit in March 2022, with a key focus on equity and sustainability. South Africa similarly convened a Skills Development Summit in April 2022, which addressed the need for investment in skills development in the face of new trends, economic challenges, and skills shortages across almost every workforce sector. Likewise, Switzerland held a Skills Summit in June 2022, with a focus on the changing nature of jobs and the widening digital skills gap, amid not only rapid but also short cycle technological advances in AI, robotics, and process automation.

In Australia, the Skills Summit took place in September 2022, with the goal of recommending immediate actions and opportunities for medium and long-term reform to address economic challenges. The two-day summit set out a reform roadmap, including 36 immediate actions and 30 areas for further activity. Steps to immediately strengthen the vocational education and training (VET) sector, enable more training to address skills gaps, while also addressing the longer term structural, systemic, and cultural changes were tabled. Incentives announced at the Summit, included the government's decision to provide 180,000 fee-free TAFE i.e., public-funded (VET) places at a cost of \$Aus1.1 billion commencing in 2023. Agreement was also reached to review VET qualifications, overhaul apprentice support, and grow the VET workforce.

The key themes and insights from the above skills summits and related exemplars indicate the criticality of the 'window of opportunity' to deliver education and training reform to boost economic recovery. Similarly, activity is also evident in education systems more broadly, as part of post-pandemic recovery. Higher education systems globally, are following suit and are rethinking, reimagining, and resetting strategies related to education futures which further leverage technological and pedagogical innovation characterized by Education 4.0 (Hong & Ma, 2022). Amid this post-COVID activity there is the tacit recognition and resurgence at the highest of government levels, in addressing skills development. As a corollary, therefore, the vocational and professional applied degree sector, as a key contributor and driver towards supporting economic recovery, must position itself accordingly.

The obvious imperative for the global applied degree sector is to be actively involved and cognizant of these discussions, with sector representation as appropriate. The sector must engage purposefully, yet flexibly, with the strategy drivers and action plans once formulated. Moreover, the value-added opportunity for the applied degree sector is to not only support *economic* recovery, but also, *social* recovery, as it commonly pertains to institutional mission statements across the sector. The applied degree sector within jurisdictions, and/or institutions, should seek to contribute to and partner in impactful ways in providing community development, *vis a vis* life-long learning (of which more will be said) as well as enabling the skilling solutions in tandem with government and industry and professional sectors moving forward. As we contemplate and plan for this contribution. What indeed are the key global

themes, innovations and shifts that need to be made by educators, institutions, and agencies to transform the future of learning in order to help shape the needs of the future workforce?

1.3 Education Futures

1.3.1 *Digital First Transformation*

As education providers consider the next normal, it is almost certain that implementing strategic action to embed digitalization as well as accelerating the process of digital transformation in education will remain high on the agenda. On-going digital transformation, based on both digitization (of analogue information) and digitalization (or processes), is a key impetus to drive, inform, and shape the future of applied degree education.

In the context of sweeping social, economic, technological, and demographic changes, digital transformation (Dx) is a series of deep and coordinated culture, workforce, and technology shifts that enable new educational and operating models and transform an institution's operations, strategic directions, and value proposition. (Brooks & McCormack, 2020)

Referencing the description above, digital transformation (Dx) in higher education learning and teaching is therefore, committed to (1) consolidating a digital foundation that is deeply embedded and coordinated within organizational culture; (2) building smart learning environments; (3) promoting the co-creation and co-sharing of quality digital educational resources; (4) exploring personalized models for cultivating students and the professional development of teachers; (5) improving the digital literacy and digital skills of teachers and students; and (6) iteratively enhancing digital awareness, thinking and capabilities throughout the digital transformation journey as technologies continue to evolve.

1.3.2 *Smart Education*

As a result of ongoing digital transformation, *smart education*, is a term used to describe learning in a digital age. It refers to those educational approaches and environments with the characteristics of high touch learning experiences, learning content adaptation, and teaching efficiency supported and informed by digital technologies. In smart education, intelligent technology such as AI is used to provide diversified support and on demand services to enhance the quality and ultimately, equity of education. From this perspective, smart education has the potential to further act as a breakthrough approach that continues to support and integrate intelligent technologies as we rethink and reset opportunities for next-generation applied degree education futures.

1.3.3 Artificial Intelligence (AI)

Artificial Intelligence (AI) is one of the fastest growing and arguably, one of, if not *the* most, societally impactful industry worldwide. AI and its multiple subdomains, including Machine Learning (ML) algorithms and Natural Language Processing (NLP), is changing the way we live, work and study. It is increasingly pervasive in our daily lives, likely more than we, the general public may perhaps even realize. AI is utilized via facial recognition when unlocking mobile phones and in various security and surveillance systems. AI has been an integral to search engines like Google and Bing, for quite some time, as well as in navigational way-finding apps like Google Maps. Likewise calling an Uber or booking a flight ticket uses AI. Social media accounts like Facebook, Twitter and Instagram are customized by AI working behind the scenes to provide curated feeds. AI powered digital assistants like Siri, Alexa and Google Assistant are readily responsive and support many routine activities and ad hoc queries. Entertainment streaming giants like Netflix and Spotify use ML algorithms to create seamless user experiences. AI-driven personalization solutions, based on customer data, are used by global brands to drive more personalized engagement. AI-powered automated Chat Bots provide quick turn-around responses to customer enquiries with 24/7 access to business information, including within education institutions.

AI is fast becoming an essential component of any competitive business or organisation. Indeed, by 2025, it is projected that some 70% of workers will utilise data to a more significant extent to inform their work. As one Accenture Insights Report states, 'In short, advancing AI maturity is no longer a choice. It's an opportunity facing every industry, every organization, every leader' (Vohra et al., 2022, p. 4). Furthermore, the report states that projections from Accenture's machine learning models suggest that the share of AI achievers globally, i.e., those organisations where AI is championed by leaders as a strategic priority, where there is talent investment to leverage AI investments; where AI tools and teams are industrialised to create a strong AI core, where AI is responsibly designed and where AI investments are prioritized over the long and short term, 'will increase rapidly and significantly, more than doubling from the current 12–27% by 2024' (ibid).

The potential extent of the impact and opportunity related to the AI industry is being projected through various research undertakings and data insights. According to a McKinsey report (Shen et al., 2022), which examined the use and impact of AI across key industries in China, if strategic cooperation and capability building can occur across multiple dimensions, then AI is expected to add upwards of ~ \$US600 billion to the Chinese economy by 2030. McKinsey's research indicates that this growth will come as a result of innovation and R&D spending to generate AI-enabled offerings that will disrupt automotive, transportation, logistics and other key sectors, like manufacturing, enterprise software and health and life sciences.

As AI and Robotic Process Automation (RPA) and allied digital transformation for business applications automate the more routine manual handling tasks previously done by humans, jobs will be eliminated. This is certainly going to be true of the

global manufacturing sector, where jobs are already being lost to AI-powered robots. However, while on one hand job losses will occur, on the other, it is also predicted that ~ 97 million jobs involving artificial intelligence (AI) will be created and new workforce required between 2022 and 2025 (World Economic Forum, 2020).

The most successful organisations will therefore, be those whose employees are empowered with the skills to make better decisions using data. However, workers are currently not receiving the training that they need and require. There is a growing skills gap which the applied degree sector can help to address, through pre-service and in-service training. Areas that may be identified for qualifications innovation and development in terms of up-skilling and re-skilling within a life-long learning paradigm include the new AI workforce jobs requirement for specialists in AI and machine learning, process automation, big data, data engineering and data analytics. Just as AI is impacting workforce sectors, so too, AI will be increasingly utilized as a value-driver across education sectors.

1.3.4 AI and Education

UNESCO released the *Beijing Consensus on artificial intelligence and education*, at the International Conference on Artificial Intelligence and Education held in Beijing in May 2019. This consensus, further facilitated the implementation of the *Education 2030 Agenda* (UNESCO, 2015) supporting and accelerating progress towards the United Nations Sustainable Development Goal SDG 4: 'Ensure inclusive and equitable quality education and promotes lifelong learning opportunities for all.' Moreover, it serves as a definitive example of a commitment which both anticipates and acknowledges an era in which AI, as a convergence of emerging technologies, will play out across education sectors. The conference included some 50 government ministers and 500 international representatives from more than 100 member states, United Nations agencies, academic institutions, civil society, and the private sector. The Beijing Consensus states that the systematic integration of AI in education has the potential to address some of the biggest challenges in education today, as it innovates teaching and learning practices.

Global Market Insights Inc. (2022) predicts that the AI education market could have a market value projection of \$US80 billion by 2030. Growth drivers include increasing venture capital investment in AI and EdTech, the exponential growth of digital data and integration of ITS in the learning process, coupled with partnerships with education content providers and adoption of cloud-based services. AI will therefore continue to be deployed and certainly impact the applied degree sector across all facets of business operations.

1.3.5 Equity of Access

The World Economic Forum's (2022) Insight Report, *Catalysing Education 4.0: Investing in the Future of Learning for a Human-Centric Recovery* is a call to action to global leaders to leverage the COVID-19 learning crisis into an opportunity for radical education transformation to ensure primary and secondary-school systems are future ready. As a 'white paper' the publication identifies key themes and insights and suggested areas of interaction informing strategic discussion and action planning, including, the United Nations (2022) Transforming Education Summit in particular. A key observation is the recognition that the skills needed to succeed economically in the Age of the Fourth Industrial Revolution (4IR) are not being taught and that the pandemic and consequent rapid technological acceleration, has further compounded the inequalities in schooling quality and attainment (World Economic Forum, 2022, p. 4). Addressing the teaching of skills for success, ensuring greater access and equity is therefore another key factor informing the 'shape of things to come' in applied degree education. Rigorous and continued efforts are necessary, not just in general schooling, but also across the post-school tertiary education and applied degree sector.

1.3.6 Enabling Sustainable Futures

Deploying a more socio-ecological imperative that fosters sustainability as a core organizational driver has increasingly been put on the agendas of organisations, enterprises, and governments as the world pivots with heightened urgency and commitment towards a net-zero agenda. Decarbonising the nine key sectors, e.g., power, oil, and gas, automotive, aviation and shipping, and steel production, that produce most global greenhouse-gas emissions, calling into frame Environmental, Social and Governance (ESG) enterprise accountabilities and audits, and embracing the circular economy at the local community level are coming to the fore, as more focused affirmative action is taken. The opportunity for the applied degree sector to contribute to this vital and globally impactful transformation lies, not only in identifying as *sustainable universities* and reducing institutional carbon footprint, but also in deploying governance practices, teaching and learning approaches, and programme innovation that enable the skilling, upskilling and reskilling of the workforce in this key area. Additionally, engaging in consultancy and applied research agendas specifically and related to the broader fields of sustainability across sectors should also be embraced.

Programme developments, across the domain fields, whether long or short term and 'bite-sized' that are responsive to learner needs are to be anticipated. These may include, for example, green business programmes that support organisations to respond to the green-imperative, the skilled use of advanced technologies will be critical to effectively and efficiently reducing climate change, programmes that support

environmental or green engineering and sustainability that can leverage existing technologies and provide zero-emission options are therefore anticipated to be in high demand. Likewise, programmes of study that focus on the intersection of a specific industry, e.g., fashion, culinary arts, and sustainability and technology should be explored. Innovation and problem-solving *with* and *for* industries, employing applied research and the investigations of innovative applications that may provide real-world solutions, such as in hydrogen energy or battery-technology research, sustainable agriculture, food manufacturing by-products utilization and bio-products processing, will provide multiple transdisciplinary sets of opportunities for the applied degree sector to explore.

1.3.7 *Life Long Learning (LLL)*

Lifelong learning (LLL) as identified in the UN Sustainable Development Goal (SDG 4) exhorts countries to ‘promote lifelong learning opportunities for all (United Nations Department of Economic & Social Affairs, 2015), thereby establishing LLL as central to a sustainable future. Richards (2020) proposes a new *global network* model for learning and teaching that serves a lifelong learning curriculum. This network model enables and requires the ability to learn continually and to adapt to new and unpredictable situations. It embraces ‘an andragogy that includes collaborative problem solving with the objective of developing transferable competences’. It is a model where:

Learning is just-in-time, depends on transferable skills, and has ready access to endless content and processing tools. The student is an entrepreneur-consultant working on multiple ad hoc teams with changing membership. The teacher is a coach who provides continuity, perspective, and methods. Performance assessment focuses on the project deliverable. (2020, p. 151)

Widening access and increasing participation through the skilling, upskilling, and reskilling of students throughout their lifetimes across both formal and non-formal credentialing in a range of modalities and purposes is, and will continue to transform providers into LLL institutions. This implies a fundamental shift in the concept of higher education and by implication applied degree education and applied professional learning. It will incur an increasingly focused shift from learning that is directed at undergraduate and postgraduate education in a more commonly held, formal credentialing sense, to a more continuous staircasing process that iteratively, addresses the needs of diverse learners through various types of accredited and non-accredited learning blocks at different ages and stages of their personal and professional lives. Institutional structures and resources will inevitably follow to ensure both comprehensive and properly delivered LLL programmes (UNESCO Institute for Lifelong Learning, 2022).

1.4 The Future of Jobs: From Industry 4.0 to Industry 5.0

Characteristically, the applied degree providers across the globe are positioned as contributors to a sector that is industry and professionally aligned and largely workforce demand driven. As a corollary, the applied degree sector's value proposition and sustainability is therefore, dependent on working in tandem with the industries and professions to examine and address projections regarding the future of jobs. This includes identifying the jobs that do not yet exist, in evolving areas where new skills areas and new job creation will be required. There are certainly some key areas of opportunity where new qualifications, inclusive of micro learning are likely to occur, relative to the local needs of industries and professions. One of the keys that will inevitably shape the future of the applied degree education sector will be its response to the shift from Education 4.0 to Education 5.0, as the transition from Industry 4.0 to Industry 5.0 occurs.

1.4.1 Industry 5.0 and Education 5.0

Whereas Industry 4.0 is driven by digitalization, intelligent environments, automation and the convergence of IT and operational technologies, Industry 5.0 aka 5th Industrial Revolution, re-engages with the human, social, and environmental dimensions as a complementary and contiguous focus within and across industries. Industry 5.0 refers to the ways in which humans will work alongside advanced technologies and AI powered systems across industries to drive tech-driven economic and social transitions via a sustainable, humancentric and resilient approach, providing solutions to societal challenges including the preservation of resources, climate change, and social stability.

Similarly, whereas Education 4.0, refers to the shifts in the education sector and the integration of digital transformation and therefore smart education in response to Industry 4.0 and its corresponding focus on digital transformation and automation. Education 5.0 looks to the evolution of an educational paradigm that more overtly seeks to engage with the realm of ethics and humanism, towards a quest for a more sustainable, equitable, and caring future.

1.4.2 Ecosystem Approach

In the applied degree sector, change and transformation is, and will continue to occur as leaders, educators, start-ups, and industry partners collaborate in more integrated and mutually beneficial ways to co-create opportunities for skilling and reskilling in green technologies and sustainability for the benefit of the circular economy. The use of advanced technologies and AI is enabling students and academics working in close

collaboration with industries and tech start-ups to engage in collaborative applied research to posit project-based learning with a focus on problem solving for value-creation. Non-traditional education providers, such as corporates (Hong, 2022), are increasingly creating academies to deliver higher level technical skilling and professional development opportunities to ensure the requisite skills for their workforce. The pragmatics of this shift implies that advantage may be gained through purposeful ecosystem collaboration to deliver optimized skilling and domain knowledge.

1.4.3 New Jobs in AI Systems

Certainly, and as already discussed, one key new job cluster area will be in the new field of AI systems. McKinsey (Shen et al., 2022) for example, likens the skills necessary in AI experts and knowledge workers as resembling the Greek letter π (π). These skilled individuals, need not ‘only a broad mastery of general management skills (the horizontal bar) but also spikes of deep function knowledge in AI and domain expertise (the vertical bars)’ (Shen et al., 2022). This talent profile signals opportunities for the applied degree sector to consider as curricula and delivery modes are reframed and reset. The provision of degree qualifications in management, AI and contextual domains will remain prevalent in higher education systems. Importantly, it also signals that the greater opportunity resides in the intersection of all three domains coupled with authentic work integrated learning. In this regard, the competition to draw students from schools into the undergraduate study and from the in-service job market into further studies including life-long learning and post-graduate studies has become increasingly contested.

1.4.4 Human Touch Skills

While digitalization, automation, and workforce re/skilling has certainly, as discussed, been the recent catch-cry within an Industry 4.0 frame of reference, there is also an emergent and as already identified, a complementary focus coming to the fore. This Industry 5.0 space, relates to the interrelationship between humans and technology in the workplace and learning experiences that foster the enduring capabilities of human-workers such as creativity, imagination, empathy, resilience, adaptive thinking, and social intelligence. In this regard, and as Beard (2018) writes,

And if robots do take the jobs, it’s our human qualities that will count ... The greatest impact of technology on learning may paradoxically be to push us towards the human (p. 306).

Such perspectives on the relationship between human and machine and the interplay between the individual, the group and societies with contemporary technology identify the need to further strengthened the development of powerful human skills. Future proofing against the realities of the digital age is therefore about strengthening

our distinctively human capabilities. Qualities such as the knowledge, skills, and attitudes required to not just communicate and work in teams in routine and fundamental ways,—as these may indeed be computerized, but to engage in *complex* communication and work together with resilience and in often ambiguous situations that require *expert* thinking and problem-solving need to be enhanced.

1.4.5 The Future of Jobs in Higher Education

It is not surprising that as a result of the pandemic, that the higher education sector has also experienced significant disruption and change. The shape of things to come in relation to jobs and skills within the academic and non-academic workforce is also in flux. Digitalisation, business process redesign, Robotic Process Automation (RPA) and the implementation of AI Chatbots, data informed decision-making, utilising data visualisations, business and learner analytics, and next generation learning and teaching technologies has meant that both academic and non-academic staff are facing significant changes and challenges to their working environments.

The *Great Resignation* has also impacted the tertiary sector just as it has other workforce sectors. Across the tertiary landscape staffing complements and profiles have shifted as staff are retrenched or reposted to secure organizational efficiencies, or decide to retire or leave to pursue other jobs and areas of passion outside of the education sector. Staff have discovered the possibilities and ease of e-meetings and digital collaboration as well as newfound productivity in the time that may otherwise have been taken up by commuting. The tertiary workforce experience has traditionally been in-person and on-campus, however, given the experience of remote work during iterative waves of the pandemic, it is likely that, while on-campus work and activities will continue to be important, that the benefits of virtual meetings and hybrid/remote options may also be deployed to retain and maintain organizational culture to rethink and adapt to the changing demands of the workplace.

Commentators and position papers currently abound as to the future of work. McGowan (2020) has more recently commented, ‘Where we once saw the future of work unfolding over years, we now believe that with coronavirus as an accelerant, everything we’ve predicted about the future of work will unfold in months.’ This new reality which is indeed seeing change in many, if not all, workforce sectors as a result of business and industrial transformation will likely test the existing model of multi-year degree education. Current qualifications development and delivery relies on the scaffolding and codifying of subject content knowledge into a curriculum, which is then taught in blocks of theoretical and/or practical knowledge to students so they come to know the knowledge and skills within the domain field(s) and can then over time, contribute to the workforce productively. Such a model may not be as easily supported, or indeed as efficient and effective, in a rapidly changing world where new knowledge is continuously created and new skills are required to capture business and market opportunity. What then might be some alternatives to this dominant model? How might the expected on-going shifts in the future of

work be accommodated within tertiary education? What changes to the traditional paradigm will be put in play to optimize student access, engagement, and success?

1.5 Future Learning: Eco-System Approaches, High Tech High Touch, Intelligent Technologies and Immersive Spaces

The pandemic unintentionally become a change agent that has activated, accelerated, and continues to re-shape the future of learning. Institutions and educators have and continue to transition and adapt to new ways of engaging with learners and industries in response to Industry 4.0 (with Industry 5.0 on the horizon) and the need to upskill and reskill in the context of lifelong learning. As has been discussed, local, national, and global themes such as sustainability, innovation and technology, entrepreneurship, and the need for future ready skills and multiliteracies have and will continue to be advanced and integrated into curricula and institutional reform agendas.

1.5.1 Teaching and Learning Practices

The *2022 EDUCAUSE Horizon Report (Teaching and Learning ed.)* (Pelletier et al., 2022) provides some indicators as to the shape of things to come for learners and educator/facilitators in the tertiary sector. Based on the perspectives of a global panel of experts, the report profiles the trends and key technologies and practices shaping the future of learning and teaching. The six key technologies and practices identified include: AI for learning analytics, AI for learning tools, hybrid learning spaces, mainstreaming of hybrid/remote learning modes, micro credentials and professional development for hybrid and remote teaching. The indicative practices identified will be familiar to most, however, for the purposes of this chapter, there are certain ones that warrant more attention.

Certainly, as has already been discussed, AI and its' generative AI systems subvariants, machine learning, deep learning, natural language processing, are the key technologies anticipated to exponentially expand higher education futures. The launch of ChatGPT in late November 2022, or example, quickly garnered and polarised higher education sector attention with its potential to upend teaching, learning, and assessment practices. Operationally, higher education institutes are already deploying AI to assist with course recommendations, managing administrative processes and utilising AI-based learning platforms, virtual facilitators, and intelligent tutoring systems to improve learner engagement and the learning experience. Institutions have started to harness the power of data and analytics to inform activities to build capabilities in terms of the student access, success, and overall student experience. A McKinsey

Insights article (Brasca et al., 2022), reports that those at the forefront of this trend are ‘focusing on harnessing analytics to increase programme personalization and flexibility, as well as to improve retention by identifying students at risk of dropping out and reaching out proactively with tailored interventions.’ Other areas, with discussion following, that are likely to impact the shape of things to come, include: partnering with the EdTech eco-system, shifts in credentialling and pedagogical practices and engagement with virtual immersive and adaptive learning spaces.

1.5.2 EdTech Ecosystem

While AI and other intelligent technologies will impact higher education as SMART tools, an important corollary to be aware of, is that EdTech companies are also increasingly proliferating education sectors with enterprising and innovating developments, including enterprise training. EdTech companies are not only developing next-generation technologies, but are also providing and/or aggregating tech-courses creating new markets outside of the traditional provider base. This trend has the potential to disrupt not only the undergraduate degree market but also the post-graduate and in-service market. In some industry and professional sectors, the threshold requirement of an undergraduate degree is giving way to a focus that is more dependent on skills competencies and soft-skills. Companies like EY, Google and IBM have embraced hiring practices that not dependent on applicants having a degree as a threshold entry point. Indeed, the Burning Glass Institute (Fuller et al., 2022), write of the ‘Emerging degree reset’ and the shift to skills-based hiring, drawing attention away from bachelor degree entry requirements to address growing workforce shortages. Based on trends in the US, the Institute projects that an ‘additional 1.4 million jobs could open to (US) workers *without* college degrees over the next five-years’ (p. 3). With such changes in the wind and as has been written in previous editions of this book series (Hong & Ma, 2022; Hong, 2022), the future of learning, specifically in the applied degree sector, lies in shifting thinking and fostering the development of a high-performing and collaborative digital education ecosystem with multiple contributors to benefit the learner and learner outcomes for the future of work.

1.5.3 Qualifications Scope Shift

As has already been discussed, in the wake of a shifting economy and non-traditional offerings provided and powered by EdTech companies and entrepreneurial aggregators, higher education faces a risk to the traditional bricks and mortar and multi-year degree structures that have been the accepted norm. Ironically, the mega-providers of massive open online courses (aka MOOCs) such as, Coursera, edX, and Udacity, emerged from university environments around 2012, i.e., Stanford, Harvard, and MIT

in the USA, leading to similar MOOC building activities in other countries. Essentially MOOCs established the beginnings of a ‘next-generation’ wave of credentials, namely, micro credentials, and are part of a larger disruptive innovation now proliferating the education market.

Given the pressures on governments and the emergent shifts in employer perspectives away from degree requirements as threshold entry points, the business model of higher education may well dramatically and irreversibly change. MOOCs have certainly served to widen access to higher education, supporting the democratization of higher education, making knowledge from universities, including from the most world-renowned institutions and elite professors around the world, more open and accessible to anyone who wishes to engage. As a form of open education that may be accessed for free through online platforms, MOOCs enable and support Goal 4 of the United Nations 2030 Agenda for Sustainable Development. As the credentialization of both online learning as well as hybrid and face to face learning delivery by non-traditional providers continues, collaboration and partnerships between traditional providers and EdTech providers to acknowledge aggregated learning or stackable credentials as a verifiable approach, with more granular recognition such as certifications for specific knowledge and skill sets registered across digital wallets aka block chain registers may well become the next normal.

1.5.4 High Tech High Touch Learning

High Tech High Touch (HTHT) can be traced back to *Megatrends* (Naisbitt, 1982) and speaks to the need for balance in our relationship with technology. For education, HTHT reframes and challenges educators to reflect on where the educator’s effort is best spent. The HTHT model of learning combines classroom technology (High Tech) with hands-on learning, guided by educator/experts (High Touch). Base line level activity, such as the initial engagement with new subject knowledge and initial skills mastery can now, quite readily be outsourced to AI-assisted adaptive or personalized technologies. Thus, allowing the educator to focus on co-creating and co-constructing more tasks involving active learning such as the application of knowledge and skills in more complex problem solving and team-based learning. HTHT adaptive learning platforms offer learning at the right pace and at the right level. While this has clear benefits for the school system, it must also be recognized that adaptive learning is also highly relevant to degree-level education. Particularly to address knowledge and skills gaps, providing a personalized approach to learning which can bring benefit to students with identified content or special learning needs where a more self-paced might enhance student success.