Rethinking lifelong learning in the 'fourth industrial revolution'

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Abstract

Two key discourses of our time, lifelong learning and the fourth industrial revolution, have been inextricably linked to offer a compelling narrative of the coupling of education models and technological change to enable individual empowerment, social inclusion and a shared prosperity. Taking a broadly interdisciplinary approach, we identify the development and key consituents of each concept and examine how they have been brought together. We identify fundamental flaws and difficulties with the concepts and their application, but also indicate how the the fourth industrial revolution can provide an impetus for thinking about lifelong learning in new ways that transcend the individual employment-focused conceptualisations that have dominated in recent times. Finally, we offer a discussion about the nature of a progressive conceptualisation of lifelong learning which might respond in a more authentic and realistic way to contemporary changes in the nature of work, life, social and economic activity and indeed to more fundamental issues for humanity.

Keywords

lifelong learning | *fourth industrial revolution* | *digital transformation* | *future of work*

Introduction

There is a long-established view that in a knowledge economy or knowledge society, lifelong learning (hereafter LLL) is '…a necessity rather than a possibility or a luxury to be considered' (Fischer 2000:265; and see London 2021). However, this view has gained new urgency in the context of the idea that humanity finds itself in the midst of a 'fourth industrial revolution' (hereafter 4IR), where further acceleration in the pace of technological change in the economy and wider society makes it essential that people continue to learn throughout their lives. The two concepts come together in a narrative that speaks to aspirations of greater shared prosperity but also greater social inclusion: there are implicit or explicit promises of individual empowerment, more democratic participation, or reducing social inequality. This latter element views the egregious inequalities of the day as temporary, with parallel aberrations evident in earlier industrial revolutions (Haldane 2018). The narrative suggests inclusive objectives for social progress with concrete recommendations for policy action developed by powerful international bodies such as the World Economic Forum (WEF), International Labour Organisation (ILO) and the Organisation for Economic Cooperation and Development (OECD). In turn, these recommendations often provide the political legitimacy for national policy, such as guiding the design of LLL systems.

We can think of the 4IR and LLL as conceptual lenses shaping mental representations, interpretations, and simplifications of reality (Bruner 1996): they offer ways of making meaning and of making sense of the social world. At the same time, they are dynamic, shifting and contested concepts with political significance, and at any one time, certain versions gain in

prominence. Prevailing ideas about LLL and the 4IR reflect much more than the current state of evidence: they also reflect powerful interests, and are mediated by corporate, state and international institutions, including the mass media, combinations of which may drive the direction of policy and/or enter accepted wisdom or 'common sense' thinking.

Importantly, the concepts of the 4IR and LLL did not develop in tandem. The first is recent, connected to the development and proliferation of artificial intelligence (AI) and related digital technologies (Brynjolfsson and McAfee 2014; Schwab 2017; Susskind and Susskind 2015). LLL has had a longer period of articulation, with roots that are often traced back to the early 1970s concepts of lifelong education 'championed by both the United Nations Educational, Scientific and Cultural Organisation (UNESCO) and the Council of Europe' (Hager 2021:14; see also Cropley 1979). However, with both 4IR and LLL, there are many other connections with earlier debates and developments. For example, in the UK, whilst the term 'LLL' was rare in policy discourse before the 1980s, adult education had become well established throughout the 20th century, owing to a mixture of local government responsibility and crucially, the support of 'non-governmental organisations, such as the Worker's Educational Association, trade unions, a number of influential universities…' (Hodgson 2000:6). A major report in 1919 (Ministry of Reconstruction 1919) championed citizenship education for adults alongside the study of such things as literature and science (Merricks 2001). Against this backdrop the rise of the concept of LLL from the late 1970s denotes 'a move by successive national governments to mould all parts of the education and training system more closely into a framework…to promote economic growth and to combat economic recession, increasing international competition and fluctuating employment trends' (Hodgson 2000:6).

That LLL is seen to play a key role in the 4IR is unsurprising, but *how* the concepts are brought together is a very important matter, for academic analysis, policy action and evaluation, but also for anyone interested in what will shape the future relationship between education, work and the quality of life. This chapter begins by outlining the concept of the 4IR, illustrating how its appeal as an idea depends on the presentation of three different elements as if they were automatically and inevitably linked. We also draw upon recent international work illustrating that governmental strategies which are connected to the 4IR have a narrow set of core concerns which on the whole downplay socio-economic inequalities or matters like climate change. We then revisit the longer-standing concept of LLL. We discuss how the concepts of 4IR and lifelong learning interact, finally outlining promising avenues for developing a progressive conceptualisation of LLL that might underpin policy, practice and research.

The fourth industrial revolution: rapid technological change, economic innovation and human progress

The concept of a 4IR is a powerful one that demands attention as it generates both excitement and anxiety. It is a 'techno-infused vision of the future' which has 'come to dominate global discussions at both the government and corporate level, as evidenced by the multitude of think tank…national…and intergovernmental…strategies that in recent years have made increasing reference to this concept' (Trauth-Goik 2020:2).

As is well-known, a key underpinning of the concept was the German 'Industrie 4.0', introduced at a major industrial technology trade show, the Hannover Messe Fair in 2011. A number of projects followed under the auspices and sponsorship of the World Economic

Forum (WEF), culminating in the publication and promulgation of a wider ranging vision of a 4IR by WEF chair Klaus Schwab (Schwab 2017). The vision is often expressed in momentous terms, e.g.:

> 'Of the many diverse and fascinating challenges we face today, the most intense and important is how to understand and shape the new technology revolution, which entails nothing less than a transformation of humankind…In its scale, scope and complexity, what I consider to be the fourth industrial revolution is unlike anything humankind has experienced before' (Schwab 2017:1)

and

> 'The scale and breadth of the unfolding technological revolution will usher in economic, social and cultural changes of such phenomenal proportions that they are almost impossible to envisage' (Schwab 2017:28)

The power of the idea is, however, much more than rhetorical. In order to begin to understand its spread, traction and significance we first need to appreciate how the idea of the 4IR usually combines different elements. We have identified three:

- *Element 1: The identification of rapid technological development, some of it in unprecedented forms.* There is a wide-ranging acknowledgement of rapid shifts in various digital technologies and their inter-relationships in a world that is increasingly interconnected, demonstrating how these shifts are changing economic and social activity in fundamental ways, including the generation of new forms of value;

- *Element 2: The assertion of a developmental/historical narrative* which confidently positions these rapid technological shifts in the historical development of human civilisation, the more recent periods of which are presented as a sequence of industrial revolutions, with a strong implication of technological determinism and an inevitability in the direction of social progress;

- *Element 3: The statement of a set of values and propositions about appropriate responses*, the clearest of which is the assertion that if it is allowed and enabled to innovate, (usually private) business and industry will provide solutions to major contemporary global problems and will make possible a world in which the lives and prospects of many will improve. This entails temporary adjustments of job destruction and polarisation in the labour market that society has to manage, seen as a necessary part of economic innovation.

The first element is the least contentious, and there is no shortage of examples which can convincingly demonstrate it across many fields of activity. Indeed, although they vary in enthusiasm, most accounts of the 4IR include illustrations of recent, rapid or ongoing change in areas such as the internet of things, AI, machine learning, cyber-physical systems, robotics, big data, and genetic engineering.

However, the danger here is that the compelling evidence of this first element is taken to support the other two, which are much more contentious. For example, with regard to the second and third, Avis argues that across a range of documents produced by consultants and business organisations about the 4IR, there is an oversimplification of industrial activity which ignores its current and past diversity as well as ignoring or downplaying the fact that some changes (such as the use of flexible working) have been in train a long time (Avis 2018).

Avis also questions the lack of serious consideration of social relations in 4IR discourse, including the distribution of power. Schwab's account occasionally speaks of the need for a collective response to the 4IR, but it is one that appears sociologically naïve. For example, he says: 'The reality of disruption and the inevitability of the impact it will have on *us* does not mean *we* are powerless in the face of it. It is *our* responsibility to ensure that *we* establish a set of common values…(Schwab 2017:13, emphases added). Given the radical and momentous nature of the changes discussed, it matters a great deal to whom the 'us', 'our' and 'we' refers: who exactly has this 'responsibility to establish a set of common values'? As we have already indicated, the third element of the 4IR concept suggests that it is the values of industrial and business innovation that must, inevitably, prevail.

There is empirical evidence that supports this interpretation. Trauth-Goik (2020) offers a discourse analysis of six national and intergovernmental strategies, namely: *Industrie 4.0* (Germany); the *Japan Revitalisation Strategy*; the EU's *Horizon 2020*; *Advanced Manufacturing Beyond the Production Line* (Australia); *Made in China* 2025; and *Accelerating US Advanced Manufacturing*. All of these were published within five years of 2011, and all make reference to either Industrie 4.0 or the 4IR. Whilst the strategies differ in terms of emphasis (for example, one from the USA has an emphasis on advanced manufacturing, whilst that from Japan has an emphasis on AI and robotics), they share a fundamental logic, having in common a:

> '…narrow lens of innovation and competitiveness through which the prospect of technological convergence is appraised, thereby revealing the underlying assumptions and motives of leading classes located within the existing market economy…the 4th IR is presented as an opportunity to upgrade existing business ideologies and structures, rather than as an opportunity to address the inequalities these structures propagate…during a time of unprecedented technological advancement and convergence, the focus is on system *maintenance* rather than *transcendence*' (Trauth-Goik 2020:12, original emphasis).

It is of note that Schwab paid some attention to societal issues that the 4IR was likely to exacerbate, such as inequality, risks to large segments of the middle class, environmental impacts and radical changes in the nature of work. Schwab concedes that 'The fourth industrial revolution seems to be creating fewer jobs in new industries than previous revolutions' (Schwab 2017:39), but also observes that 'It has always been the case that technological innovation destroys some jobs, which it replaces in turn with new ones in a different activity and possibly in another place' (:38). In other words, the (global) market will eventually sort things out. It is thus no surprise that matters of technological unemployment and underemployment have a very low profile in most of the six strategies examined by Trauth-Goik. In fact, the strategies demonstrate a clear and core hierarchy of terms, with 'innovation' the most prominent cluster, followed by 'industry', then 'business'. Collectively, the strategies

did not make much use of terms falling into a 'jobs/careers/employment' cluster, though this did differ between them, being a particular focus of the *Japan Revitalisation Strategy.* Trauth-Goik explains that earlier Japanese strategies have been human-centred and concerned with 'balancing the needs of citizens versus capital' (2020:13-14).

Trauth-Goik goes on to analyse the strategy documents using keyword clusters derived from a range of goals in the 2030 UN Agenda for Sustainable Development, concerning such matters as poverty eradication, healthy lives, education and LLL, productive employment and decent work, inequality, climate change, and access to justice. The outcome shows that none of these matters took precedence over what was mentioned above as the 'clear and core hierarchy' of innovation, industry and business. Some references were made to technological contributions towards problems of pollution and climate change, and to facilitating long-term education and LLL. However, reducing poverty and inequality only appeared in one of the six strategies, i.e. *Horizon 2020.*

Such an analysis shows why we need to approach the 4IR discourse with great caution, remaining wary of the purported congruence between the three elements that we identified earlier. For Trauth-Goik, the 4IR is 'exclusionary' and it fosters a 'one-dimensional and business-oriented view of the future' (2020:17) in which the interests of humanity are seen as best served by business and industry. Arguably, what we have termed the third element of the 4IR reprises a familiar line of reasoning from neoliberal economics, placing private business and market competition above all other realms of life and insisting on the primacy of economic growth to solve all problems. Here however, there is a further step: 'In endeavouring to keep separate the interests of business and wider society…the 4IR discourse invites innovation and creativity which is demonstrably misaligned with the long-term interests of the species and planet (Martorana and Smith, 2018)' (Trauth-Goik 2020:17). Trauth-Goik goes on to provide some early pointers to an alternative, involving revisiting the origins of the word 'technology'. There is an interesting parallel here with Mazzucato's approach to mission-oriented research and innovation, wherein investment-led growth that tackles grand challenges (such as climate change) requires breaking with habitual assumptions about the nature of innovation and the roles and capacities of the state in relation to private capital. The primacy of public and social value in in this analysis can be read as a challenge the dominant 4IR narrative (see for example Mazzucato 2018).

Thus, the 4IR discourse has been subject to critique, though perhaps not as much as might be expected. Peters questions the historical narrative (the second element of the 4IR discourse) which categorises a whole raft of contemporary change as 'industrial', showing how the parallel with earlier rapid industrial change is over-drawn. He argues that the contemporary period does have a distinctive logic which is realising a 'single planetary technical system that enables access to global markets in instantaneous real time'. The system 'becomes dynamic and transformative demonstrating the properties of chaotic and complex systems that also increase volatility, interconnectivity and unpredictability. This is in part the consequence of the digital logic that drives the single technical system of "algorithmic capitalism"' (Peters 2017:3).

We suggest that the 4IR narrative is seductive precisely because it deliberately and rhetorically conflates the three elements. Rapid and radical developments in digital technology are

coupled with the creation of an illusion of historical inevitability and a profound powerlessness in the face of technologically-driven change. Disaggregating these elements is therefore much more than a conceptual nicety because it can help policymakers and others to work out where to focus their energies and attention whilst also reminding them that – as with all aspects of technologically-related change through history - there are always choices to be made and questions of value at stake in how technological affordances play out.

Lifelong learning: economic, personal and democratic participation

By the late 1990s, many western governments had made a concept of LLL central to their education and training policy, driven mainly by a human capital rationale and a focus on skills upgrading to remain competitive in the increasingly deregulated global market economy (Brown, Lauder and Cheung 2020). LLL was typically portrayed as a vehicle for increasing opportunity and social mobility, or as a more general panacea for wider social problems. Transnational organisations including UNESCO, OECD and EU, all pointed to the growing importance of LLL and the need for national strategies to be developed. UNESCO's *Learning to Be* (Faure, Herrera and Kaddoura 1972) and the European Commission's *Learning: The Treasure Within* (Delors 1996), were both prominent. The latter outlined four 'pillars' of learning to know, learning to do, learning to be, and learning to live together, a schema that continues to influence policy discussions of LLL.

However, such all-encompassing concepts of LLL are inherently difficult to use as a guide to national public policy and institutional reform, for three reasons. Firstly, the policy objectives that follow:

> '…often deal with "soft", intangible and complex issues – notably learning rather than education, for example…[and]…they involve a broad and diverse range of actors, including large numbers of individual citizens and a variety of policy agencies rather than a single department'. (Field 2000:249-50)

Secondly, LLL has sometimes been presented as a panacea. In the UK it was expected to 'improve educational standards, national competitiveness, wealth creation, personal well-being, social cohesion, citizenship and the quality of life' (Robertson, quoted in Coffield 2000:32). Thirdly, and relatedly, LLL is an *inherently composite* concept, and an attempt to hold together divergent strands, interests and agendas which are sometimes in tension with one another, even within a single national context (Coffield 2000). This complexity is difficult to keep in view, and there is a constant risk that LLL becomes an 'empty signifier' (Laclau, 1996). In the account that follows, we signal a three-way division of the common dimensions which appears to be particularly useful for grasping these tensions, but also for thinking about opportunities for development and change.

Biesta's work, based on a critical reading of supra-national policy documents from UNESCO, OECD and the European Union is a particularly helpful starting-point. Whilst the policy recommendations from these bodies do not *determine* national policies, they do have a strong influence in agenda-setting, benchmarking, and international comparison. Examining key examples over time, Biesta identifies a fundamental shift at the level of the values that the organisations convey through LLL, and presents a convincing argument that this shift

contributed to the rise of a 'learning economy' discourse and a move away from 'learning to be' towards 'learning to be productive and employable':

> 'Whereas in the past lifelong learning was seen as a personal good and as an inherent aspect of democratic life, today lifelong learning is increasingly understood in terms of the formation of human capital and as an investment in economic development. This transformation is not only visible at the level of policy; it also has had a strong impact on the learning opportunities made available to adults, partly through a redefinition of what counts as legitimate or 'useful' learning and partly as a result of the reduction of funding for those forms of learning that are considered not to be of any economic value' (Biesta 2006:169)

Biesta identifies a key turning-point, namely the 2000 European Council's Lisbon Strategy and its goal to make Europe 'the most competitive and dynamic knowledge-based economy in the world' (Van der Pas 2001, cited in Biesta 2006:171). In addition to its demonstration of the malleability of LLL policy, Biesta's analysis follows Aspin and Chapman (2001) in pointing to its composite nature. There are three dimensions which, whilst they vary greatly in importance and visibility, are generally persistent components, namely: (a) LLL for economic progress and development; (b) LLL for personal development; and (c) LLL for social inclusiveness and democratic understanding and activity. These 'economic', 'personal' and 'democratic' dimensions offer a triangular model, and whilst all three feature in major supra-national declarations, the more recent of those give increasing primacy to the economic dimension: economic growth has become *intrinsically valued* in the way that earlier documents positioned the valuing of democracy (e.g., Faure, Herrera and Kaddoura 1972) or social inclusion and social cohesion (e.g., OECD 1997).

Accompanying this general shift in what is valued is an increasing individualisation of responsibility in LLL and a 'reversal of rights and duties'. Where once the state may have seen itself as having a duty to provide or orchestrate opportunities and resources,

> '…it seems that lifelong learning has increasingly become a duty for which individuals need to take responsibility, while it has become the right of the state to demand of all its citizens that they continuously engage in learning so as to keep up with the demands of the global economy. Not to be engaged in some form of 'useful' learning no longer seems to be an option…' (Biesta 2006:176)

There is research that reveals the difficulties of maintaining a workable balance between the 'economic', 'personal' and 'democratic' dimensions at national level, especially when LLL policy is introduced alongside institutions and cultures that are already 'bedded in'. In the UK, for example, political enthusiasm for LLL put it at the very centre of government economic policy in the late 1990s. The vision (e.g., DfEE 1998) encompassed a broad range of goals but with a primary focus on the economic. Extensive reform of the school sector was already driven by human capital thinking and the needs of what was characterised as a 'knowledge' economy (Brown, Lauder and Ashton 2011), in which education is primarily investment in the productive capacity of individuals. Reforms included an aggressive promotion of school choice and diversity in the name of driving up standards and raising both achievement and productivity. Subsequent assessments of LLL policy point to a clash of purposes: Hargreaves

(2004) argued that school-centred policies did not contribute effectively to key purposes of LLL, such as learning how to learn and the development of generic skills; Schuller and Watson's more thoroughgoing assessment pointed to the failure of 'a system which achieves its immediate objectives of raising young people's qualifications, yet leaves them without an appetite to carry on learning'. Additionally, many were leaving school without basic skills or any qualifications, and were 'therefore without the foundation for subsequent learning…Having these fundamental competences is arguably more important than achieving a minimum number of subject certificates' (Schuller and Watson 2009:49). It seems that the priority given to raising school examination outcomes in the name of economic productivity is a major reason that a vision of LLL did not persist and flourish in England.

A second national example shows how the tensions remain visible even where a conceptually strong form of LLL pertains with ongoing and explicit political support. In Singapore, Tan (2017) suggests the well-established *SkillsFuture* policy programme is underpinned by three 'models' which are close to the 'economic', 'personal' and 'democratic' dimensions discussed above. The 'skills growth model' has a focus on enhancing skills for greater economic prosperity and draws upon human capital thinking. The 'personal development model' includes 'individual self-fulfilment in all spheres of life', harking back to long established theory and practice in adult learning. The 'social learning model' '…underlines the role of institutions of trust and cooperation as the means to bring about not just economic progress but also social equity' (Tan 2017:280). Having identified these, Tan arrives at the view that a 'triadic' concept of LLL seeks to integrate the diversity of aims in each of these models. Her view is that although the major investment in Singapore is 'primarily driven by economic considerations' (:281), at the same time a broad vision of LLL is sustained.

Tan's major contribution is to outline challenges that frustrate the 'successful promotion of lifelong learning through the SkillsFuture movement in Singapore' (:283). She identifies the sociocultural preference for academic rather than vocational education; a lack of a strong culture that underscores not just skills but also the habits of mind needed forLLL; and the dominant ideology of pragmatism. With the first of these, an important parallel with the UK experience is that aspects of an established schooling system work against the vision of LLL that is encapsulated in SkillsFuture. Widely-held public perceptions about distinctions between academic and vocational qualifications, despite their over-simplifications, play into beliefs that university degrees provide the best basis for individual future security, driving much behaviour in the secondary phase.

As well as illustrating something of the tensions, these national examples show how - despite rhetoric to the contrary – that institutional systems and cultures of schooling can be in conflict with the goals of LLL. This is a point underlined by Gleason (2018) in her overview of Singapore's higher education system and recent university reforms under *SkillsFuture* and the *Smart Nation* initiative. While *SkillsFuture* seeks to make LLL educational opportunities available to the broad Singaporean workforce, the *Smart Nation* initative seeks to support the pervasive adoption of digital and smart technologies (Singapore Government 2021a; 2021b). The Government's earlier *Report of the Committee on the Future Economy* (Singapore Government 2017) explicitly addressed responses to the 4IR. As we would expect, these included system changes to support upskilling and more flexible provision (such as an increased use of short 'stackable' modular programmes). More surprising is that the tension with established institutionalised schooling is acknowledged, and the report discusses trying

to reduce the expectation upon students always 'to seek the highest possible academic attainment as young as possible' and how they might be encouraged instead 'to learn and acquire new skills throughout their lives' (Gleason 2018:154).

Broad shifts in what is valued in declarations about LLL, along with shifts in what is promoted, incentivised, funded and so forth, also give rise to new questions about motivations for learning. Biesta asks why individuals would want to engage in learning 'if decisions about the content, purpose and direction of one's learning are beyond one's own control'? (Biesta 2006:176). While Biesta is right to suggest that grand economic visions (such as that in the Lisbon strategy, mentioned earlier) are not likely to motivate most individuals, we would add that there is no shortage of other motivations where people are afraid of losing their jobs in conditions of job scarcity (Brown, Lauder and Cheung 2020). In the next section we turn to consider such inter-relations between 4IR-inspired agendas and LLL.

The fourth industrial revolution and lifelong learning

Thus far, we have argued that the concept of a 4IR, at least in its original and influential formulations, contains three elements, and that the first, with its focus on advances in digital innovation, does not necessarily give credence to the second and third which are much more contentious. We have also argued that the concept of LLL is helpfully approached as a composite of three strands or dimensions which vary in relative strength and are in some tension with each other, and that the prominence given to each has changed over time. We now turn to consider the implications of the dominant policy narrative of the 4IR for existing accounts of LLL. Our core questions here are: (a) in what ways have there been attempts to bring the two concepts together?, and (b) in what further ways might the two concepts be brought together? Our primary interest is in exploring the possibilities and prospects for progressive LLL policy which facilitates positive societal responses to the changing nature of work, production, consumption and social life that come with rapid economic, technological and social developments.

Whilst Schwab (2017) did not refer directly to LLL when he outlined his grand narrative of the 4IR, he did include mention of education models to enable the development of human capabilities to support human-machine complementarity:

> 'In thinking about the automation and the phenomenon of substitution, we should resist the temptation to engage in polarized thinking about the impact of technology on employment and the future of work. As Frey and Osborne's work shows, it is almost inevitable that the fourth industrial revolution will have a major impact on labour markets and workplaces around the world. But this does not mean that we face a man-versus-machine dilemma…*leaders need to prepare workforces and develop education models to work with, and alongside, increasingly capable, connected and intelligent machines*.' (Schwab 2017:43, emphases added)

This view is a variant of a longer-standing portrayal of a race between education and technology (Goldin and Katz 2008) in which society must invest in an education system, including LLL, to enable workers to adjust to the disruption brought about by rapid technological change, in this instance preparing them with longer-term skills and traits that machines cannot replace (Levy and Murnane 2013). Clearly, this line of reasoning takes us beyond any simple idea of upskilling individuals for new and specific forms of work, focusing

as well on mechanisms, capacities and potential, i.e., more of a 'system' perspective. A report from the World Economic Forum (2018) takes this further, calling for the creation of an 'ecosystem' to support LLL, retraining and upskilling. In this ecosystem, as well as governments and individuals, businesses have an important part to play if we are to avoid 'technological change accompanied by talent shortages, mass unemployment and growing inequality' (:v). Specifically, and in contrast to what is often typical, businesses are exhorted to become more active in supporting existing workers to attend to reskilling and upskilling:

> Our analysis indicates that, to date, many employers' retraining and upskilling efforts remain focused on a narrow set of current highly-skilled, highly-valued employees. However, in order to truly rise to the challenge of formulating a winning workforce strategy for the Fourth Industrial Revolution, businesses will need to recognize human capital investment as an asset rather than a liability. This is particularly imperative because there is a virtuous cycle between new technologies and upskilling. New technology adoption drives business growth, new job creation and augmentation of existing jobs, provided it can fully leverage the talents of a motivated and agile workforce who are equipped with futureproof skills to take advantage of new opportunities through continuous retraining and upskilling (World Economic Forum 2018:v)

The OECD takes the 'system' idea a step further through developing a 'dashboard' comparing the future-readiness of countries' adult learning systems, similarly pointing to the vision of rapid technological change that require workers to be provided support in terms of how skills and careers are to be maintained:

> Globalisation, technological progress and demographic change are having a profound impact on the world of work. These mega-trends are affecting the number and quality of jobs that are available, how they are carried out and the skills that workers will need in the future to succeed in the labour market…Adult learning systems have a key role to play in enabling individuals to keep their skills continuously updated to stay employed and/or find new jobs. In most countries, failure to develop and maintain skills that are relevant to labour market needs has translated in recruitment difficulties for employers, coexisting with individuals struggling to find jobs matching their skills. Such imbalances are costly for the individual, employers and society as a whole. (OECD 2019:1)

Like WEF, the OECD highlights an important role for employers, pointing out that it is in the interest of businesses to enable their employees to keep updating their skills, as this will facilitate the introduction of new technologies or the making of organisational changes that keep them competitive.

These declarations are an important and authoritative source for those concerned with formulating or updating LLL policy. However, a more critical perspective is required if we wish to understand their prospects for success. The recent work of Means (2019) considers dominant characterisations of the relationship between 4IR and LLL via what he terms 'sociotechnical projections of urbanity and education' emerging in the last decade or so. Here technological development is assumed to offer infinite scope for solving a range of social, economic and environmental problems. Focused mainly on the city and visions of how cities will develop, these projections are 'popularised at TED Conferences and Ideas Festivals and

undergirded by the Promethian ambitions of Silicon Valley' (:205). Such visions of the future present the city as the site of intervention, and new technologies (especially the digital integration and optimisation of human activity and the physical environment) as the vehicle for attaining a more sustainable future. Creativity, and especially the capacity to invent and innovate, is positioned as the key capabiiity. Crucially,

> *'…*learning is framed as the principal *imperative* of the here and now. A redesign of education alongside emerging technology is thought necessary to ensure development of the creative, aesthetic, technical, scientific, and innovative capacities required for achieving a vibrant future' (Means 2019:206. Original emphasis).

Means goes on to give an overview of these representations, constructing three ideal-types from the range of narratives in circulation. The first is 'solutionism' wherein 'urbanity and learning are conceived as a networked and customizable project aligned with creativity as a resource for solving twenty-first century problems' (:215). For the most part this takes the form of devising ever more complex algorithms.This approach is illustrated with the example of software corporation Cisco, for whom learning is the principal means of stimulating entrepreneurial innovators and therefore economic productivity. The second ideal-type is 'collaborationism', wherein increased technological networking enables increased participation, collaboration and sharing in solving a similarly wide range of current problems. These affordances and the new forms of value they bring are also seen to pave the way for fundamental economic transformation, where capitalism and bureaucractic states give way to a 'collaborative commons' (e.g., Rifkin 2014). The third ideal-type is 'techno-realism', as exemplified in the work of Cowen (2013). This dystopian account predicts that technological developments such as AI will rapidly and permanently exacerbate urban and regional inequalities and will consolidate a small elite and a large underclass, the latter facing either continual precarity or unemployment. In this scenario, a kind of extreme meritocracy has the individual's fate dependent on their personal resilience and their investments in learning of a sort that opens up opportunities to invent, own or add value to the technological means of production.

These ideal types have quite different ontological reference-points, and while the differences are important, our main concern here is with what the representations have in common. As Means puts it 'each signal a prevailing sense that technological change exists as an inevitable, isolated, and objective variable' (:214) and that they each 'reflect forms of ideological reasoning inherent to an education futurism as it positions digitalization as a force of change outside complexities of power and history' (:215). Means goes on to note that despite there being a whole range of 'utopian and dystopian scenarios and alternative futures' available, nevertheless

> '…the rationalities of solutionism, colloaborationism and techno-realism each share a common ideological orientation reflecting a paradox…Namely, within the realm of technology anything is thought possible, while at the level of political economy nothing is…'

And more specifically,

> ‘Witin such boundaries, serious debates over our patterns of production, exchange, ownership, labor, consumption, and endless growth are largely made invisible. Simultaneously, we are inundated with fantastical narratives of technological change…alongside their projections of creativity and learning as resolution, transcendence, and resilience’ (Means 2019:220).

This assessment encapsulates a fundamental problem and further illustrates the ideological nature of conventional 4IR discourses which, as Trauth-Goik argued, offer a one-dimensional view of what might best serve the needs of humanity. It strongly suggests that the question ‘what should we do about rapid digital technological change’, whilst important, is the wrong starting-point if we are serious about refreshing the concept of LLL. A more realistic and productive starting-point might be the questions ‘what kind of society do we want, how can it be realised sustainably, and what models of learning will serve us best’? Crucially, the ‘we’ here must encompass a much wider cross-section of people and interests than those represented in dominant portrayals of the 4IR.

Towards a progressive concept of lifelong learning

The tendency for the ‘economic’ dimension to come to dominate LLL policy, noted earlier, could be understood as a triumph of neoliberalism, reflecting the influence of global corporate interests and a narrow view of skills and human capital, linked to the idea of a ‘knowledge economy’ as the main route to national economic survival in a global market. However, and by contrast, rapid technological changes of the sort outlined in 4IR discourse question the relative certainties of a narrow view of skills and how these contribute to productivity: the very idea that it is possible to discern skills ‘gaps’ and then fill them with a degree of efficiency in a deliberate policy-driven process is undermined. There are abundant examples of how ‘digital disruptors’ are in the process of changing established areas of economic activity and their associated labour markets. These are not confined to automation in manufacturing, distribution, retail and banking but also apply to large swathes of professional and service work (Susskind and Susskind 2015) and to the exponential growth in the gig economy in fields like food delivery and taxi services. Jordan (2019) and others argue that the very distinction between producing and consuming is itself increasingly blurred by digital transformations, giving rise to a range of changes in jobs, workplaces, homes, infrastructures, social lives, domestic lives and leisure. The key questions here centre on what sort of learning might support ordinary citizens in this changing landscape, what might enhance their understanding of such social change, and what could assist them with surviving and thriving in a new context? (Bound et al 2020). Thus, the first element of the 4IR highlights the need for a fresh conceptualisation of LLL.

As we have seen, in addition to its account of far-reaching technological change, the 4IR discourse also presents strong messages about inevitability, about how this sits in the historical development of humankind and how corporate interests have the capacity to provide solutions to the new problems that are generated. This brings us to a further crucial point: regardless of their questionable basis in evidence or their validity, such messages give rise to new anxieties. Our view is that LLL can be an important counterweight to these anxieties, with the potential to provide individuals and communities with the tools to navigate – perhaps sometimes negotiate – their way. A progressive LLL policy and provision might enable individual empowerment but also contribute to social cohesion in times of rapid change. Where

LLL has at times been narrowly conceived to offer ways to mitigate individual or national risks of economic marginalisation, the 4IR discourse makes it easier to imagine and to advocate forms of LLL that attend to democratic and social participation, a view articulated by Painter and Shafique:

> 'Technological change and economic shifts are creating an ever more urgent need to ensure growth is inclusive and fairly shared…In response to these trends, we need a much greater focus on socially inclusive lifelong learning. This means equipping more people with the cognitive skills and knowledge that are developed through academic or vocational education, but it also means greater equity in the distribution of the non-cognitive ('soft') skills, such as resilience and confidence, that are increasingly important to success at work and to life chances more generally (Painter and Shafique 2020).

Similarly, a universal entitlement to LLL is recommended by the International Labour Organisation's Global Commission on the Future of Work, who note the urgency of a new conception of LLL that is comprehensive, people-centred and rights-based. This is a 'key strategy to help workers adjust to change, prevent the high social costs and maximise the positive effects of the complex and disruptive changes that lie ahead' (International Labour Organisation 2019: 3).

Statements of this kind underline a pressing need to rediscover the often diminished 'personal' and 'democratic' dimensions of LLL that we introduced above. We agree with Means who says that there is a need 'to generate new forms of critical analysis…as well as engaging with and offering counter perspectives that take a more creative and expansive sociohistorical view' (2019:220). Means suggests these might include the vision of digital technology as socially emancipatory (e.g., Srnicek and Williams 2016), or another based on appreciating how 'info-capitalism has created a new agent of change in history, the educated and connected human being' so that there are 'millions of networked people, financially exploited but with the whole of human intelligence one thumb-swipe away' (Mason 2015:27).

We agree that these perspectives may be helpful, whilst noting that they still begin with technological change. A progressive concept of LLL needs to incorporate a more thoroughgoing account of learning and what it is for. There are longer-standing attempts to clarify these matters which instead come from more philosophically-rooted insights on the nature of learning and its place in human societies. The 'lifewide learning' concept developed by Jackson (2012) is one excellent example, itself grounded in the earlier work of educators such as Lindeman and Dewey. Another would be a learning theory that has always and explicitly put employment-facing needs equally alongside personal and societal needs, i.e., the capabilities approach (e.g., McGrath et al 2020; Powell and McGrath 2019), grounded in the earlier work of Sen and Nussbaum. In both cases, there are rich ontological views of the person, of human flourishing, of learning, and indeed the significance of social location. We suggest that these approaches, augmented by insights in the psychological and adult education literature (Fleming 2021) are a profitable starting-point for the process of arriving at a reconceptualisation of LLL.

A refreshed idea of LLL would also need to take into account the fact that the nature and meaning of work are changing, often quite fundamentally (Morgan 2019). Whilst there is a

'perpetuation of an ideology of work as a source of rights and income entitlement' (Peters 2020:485), there is constant *de facto* erosion of this, especially for those living on poverty wages (Judge and Slaughter 2020). Furthermore, while many governments are concerned with enabling industrial transformation for a better future of work, this is often more difficult to achieve than it may have seemed in the past. In conditions of labour scarcity, a challenge is to get enough people with the skills to take up new opportunities presented by technological innovation, in keeping with orthodox human capital assumpions (Autor, 2015). Instead, in some societies there is an opposite structural problem of *job scarcity*, where the so-called race between education and technology is reversed, as workers (especially young workers, and especially the more qualified) struggle to find jobs that match their educational achievements. This shift has profound implications for these and other less-credentialled workers, and for the actual and perceived purposes of learning opportunities through the lives of most people, and some long-standing assumptions about the relationship between work and learning no longer apply (Brown, Lauder and Cheung 2020; Brown 2021; Brown and James 2020).

Conclusion

Our analysis of the dominant formulation of the 4IR acknowledges its characterisation of the importance of technological change. However, we also point to how the narrative incorporates other, more ideological and values-based elements that reflect narrow 'one dimensional' interests and which claim that business innovation will take care of everything. Concepts of LLL are similarly composite, but for a different reason: they are an attempt to bring together interests and objectives that are in some tension. We would argue that a concept of LLL is qualitatively different to 4IR, and much more likely to facilitate policy formulation in any system of governance that concerns itself not only with productivity and profitability but also with such matters as the quality of life and well-being of citizens, democratic participation, and community cohesion, sustainability and the future of the planet.

At the same time, we suggest that the dominant 4IR narrative is helpful - as a provocation, catalyst or impetus - for refreshed thinking about LLL. Peters notes that many policy responses to technological change are conservative, seeking to preserve society as it is:

> 'Education is seen a social sponge and lifelong learning is seen as a 'solution' to the need for perpetual retraining in new skills. The emphasis seems to fall on mopping up the unemployed, creating work, rather than focusing on a sustainable future society that can protect its citizens' (Peters 2020:486).

Taking Peters' latter point seriously, we conclude with some 'principles of procedure', based on the foregoing discussion, that we feel could usefully inform the development of a progressive concept of LLL. A progressive concept of LLL would:

1. begin from, encapsulate and promulgate a coherent view of the person/citizen and the person/citizen's entitlement to learning opportunities, including their right to ethically sound learning opportunities and to privacy;
2. maintain breadth in its view of the learning process and its view of the range of purposes and beneficiaries of learning activity. This would acknowledge that whilst many worthwhile learning activities are directly work- and job-oriented, many others do not have an obvious or immediate connection to the workplace, or are undertaken before such a connection can be seen;

3. direct resources to provision that responds to known and emergent employer needs for upskilling whilst also engaging in constant horizon-scanning for emergent jobs and skills, and new forms of economic activity, responding early and experimentally to these including 'bottom up' approaches to economic and social innovation;
4. direct resources to provision that responds to known and emergent societal, community and environmental needs, such as areas of the green economy;
5. provide opportitunities which support individual agility and transitions as a right in a time of inevitable rapid technological change, whilst recognising that greater agility may itself reduce opportunities for some forms of workplace learning;
6. pay particular attention to building creative and other capacities of the sort that machines are not good at, thereby contributing to the maintenance of human dignity and self-worth amongst citizens;
7. foster the creation and promote the use of new tools for learning, which themselves often incorporate advanced AI, whilst maintaining ethical standards (e.g., preventing the unethical use of learning-related data in career progression);
8. ensure the wide and continuing availability of opportunities for citizens to engage in learning that builds critical understanding of recent and comtemporary technological developments and their effects - positive and negative – on lives, livelihoods, propects and well-being;
9. have prominence as a fundamental and assessed part of the school curriculum, such that an understanding of and preparedness for LLL is a core, regular and expected feature of schooling for all citizens.

Clearly, these 'principles of procedure' are only a starting-point and could be translated into many different structures and activities. They recognise that LLL must be a pluralistic concept (James 2020), attending to the the three dimensions described earlier (economic participation, personal development, democratic participation). Whilst these are in some tension, perhaps the point is not to seek to resolve such tensions, but to recognise them for what they are, as fault-lines running through any society that seeks to find accommodations between capitalist relations of production, elements of democratic governance, concern for social cohesion, health, the quality of life and ecological sustainability. To adapt a phrase quoted earlier by Trauth-Goik (2020:17), our analysis leads us to propose a LLL discourse that supports learning, innovation and creativity, which is demonstrably aligned with the long-term interests of the species and planet at least as much as it is to those of capital.

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