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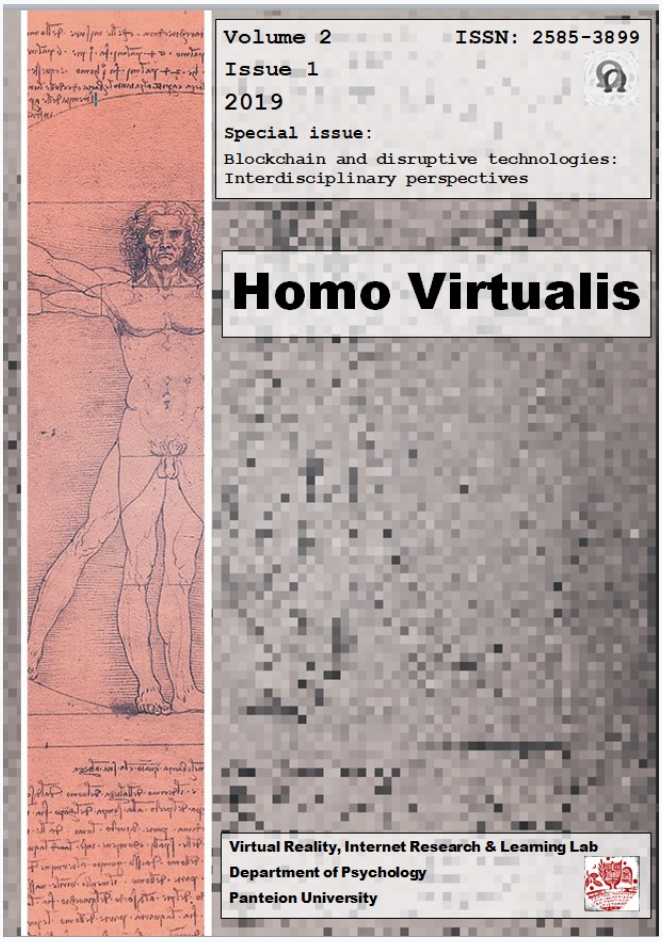


# Surviving and thriving in the Fourth Industrial Revolution: Digital skills for education and society

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# Surviving and thriving in the Fourth Industrial Revolution: Digital skills for education and society

**Charalambos Tsekeris**[1]

**Abstract:** This concise article maintains that, in times of structural and persistent crisis, Europe needs to effectively tackle the multiple challenges and existential fears by cultivating a strong and dynamical digital skills ecosystem, based on collective values and the fundamental liberal principles of co-creation, co-evolution, and collective intelligence, over against the obsolete principles of optimisation and top-down administration and control. This will arguably result in upgrading humanism (humanism 2.0) and democracy (democracy 2.0), and in boosting responsible innovation and, therefore, adaptiveness, as well as in translating technological progress into inclusive and sustainable economic growth, and risks into creative opportunities for all citizens.

**Keywords:** Digital skills, Fourth Industrial Revolution, Industry 4.0, Internet, Education, Disinformation, Knowledge, Democracy, Globalisation

## Introduction

On 19 April 2016, the European Commission, under the responsibility of Commissioner Oettinger, launched an ambitious strategy on digitising the European industry. Mariya Gabriel, as current Commissioner for Digital Economy and Society, is now responsible for its systematic implementation. This pertains to the first industry-related initiative of the Digital Single Market package,[2] aimed to accelerate responsible and sustainable innovation, to boost productivity and economic growth, to fight increasing social inequalities, and to improve EU citizens' living standards and job opportunities.

Nowadays, the inconceivable spread of digital technology and Industry 4.0, representing the Fourth Industrial Revolution (Schwab 2016a, 2016b; Prisecaru 2016; Tsekeris 2018),[3] is rapidly changing the structure, nature, character and dynamics of communication, consumption, production, employment and learning within the European Union and worldwide, lead-

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[2] See https://ec.europa.eu/commission/priorities/digital-single-market_en.
[3] See https://toplink.weforum.org/knowledge/insight/a1Gb0000001RIhBEAW/explore/summary.

ing to novel types of jobs and novel types of education, i.e. *Education 4.0* (Benešová & Tupa 2017).[4] But it is also leading to the vital and urgent need for every European citizen to have at least *basic and transversal digital literacy skills* in order to live, share, communicate, work, learn and actively participate (and even thrive) in the contemporary speedy, complex, hyper-connected and increasingly knowledge-based society.

Digital literacy skills include information literacy skills, media literacy skills, and Information and Communication Technologies (ICT) literacy skills. Interestingly, information, media, and technology skills constitute a strong and integral part of the new framework for the twenty-first-century learning paradigm; according to the Partnership for 21st Century Skills (P21) (see Figure 1).[5] This learning paradigm helps us to energetically navigate our enigmatic future and decisively dispel "old" or "received" or "traditional" dichotomies, like those pertaining to the content vs. skills debate.

In general, digital skills are regarded as the "primary requirement for conducting capital-enhancing activities online, for obtaining positive outcomes from Internet use, and for the entire process of access and information inequality" (de Boer et al., 2019; see also Van Deursen & Van Dijk, 2011). They have become an essential part of a comprehensive education framework (equally important as mathematics or learning a language), so that without a specific digital learning program a part of the population will be illiterate, unable to meet the necessary job requirements, "and access to technology will be distributed unevenly, exacerbating inequality and hindering socio-economic mobility" (Park 2016; see also McCormack 2014). We now proceed to briefly show the social importance of the new (digital) education paradigm, as well as the dynamic need for upgrading humanism and democracy in the wake of the Fourth Industrial Revolution.

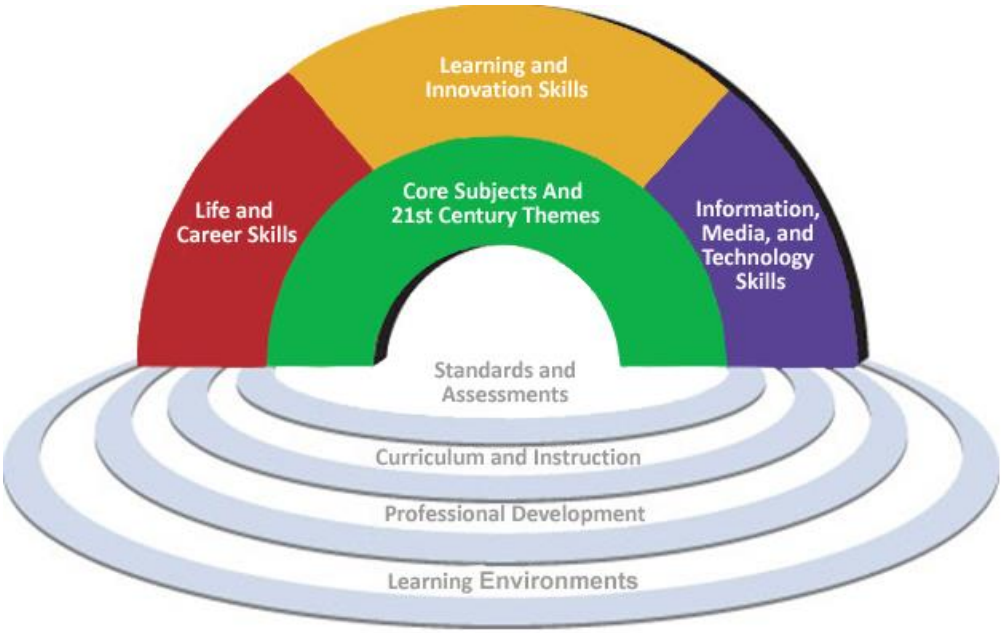


**Figure 1.** *The P21's framework for 21st-century learning* (source: https://en.wikipedia.org/wiki/21st_century_skills)

[4] See https://www.timeshighereducation.com/hub/jisc/p/preparing-education-40.
[5] http://www.battelleforkids.org/networks/p21/frameworks-resources.

**A new education paradigm**

Increasingly, European societies are confronted with the positive challenge to build a new, dynamic educational system that prepares citizens for creative work and nonlinear career paths, as well as for the new phase of digital globalisation, i.e. *Globalisation 4.0* (Schwab 2018; Baldwin 2019), in which our current institutions and jobs will fundamentally change. Procedural and rule-based work is now being robotised and automated, thus leading many people to update their digital skills, perceived as the global currency of 21st century economies (OECD, 2012),[6] and change their professional trajectories (mainly oriented toward the information- and knowledge-creating sector). To put it sharply, technology is rewriting society's fundamental rules (Wadhwa, 2016).

Hence, education changes its paradigm; it tends to become less standardised and more personalised (education anywhere and anytime), with particular emphasis on creativity, collaboration, knowledge production and sharing, complex problem solving, flexibility, innovation, adaptiveness, resilience, and leadership skills (Brailas et al., 2017). New digital skills, which variously mix hard skills (ones that are more tangible, measurable and quantifiable) and soft skills (ones that enable people to be flexible, cooperative, creative, innovative, and adaptable in different roles or in different career fields),[7] can turn participatory information platforms, the emerging Internet of Things (i.e. Post-Internet) and the *Spatial Web* (Web 3.0)[8] into an opportunity for everyone.

Greece, which still has a very low score on the DESI (26$^{th}$ in DESI 2017 & 2018), is steadily following the European Commission's Framework of the New Skills Agenda for Europe and the Grand Coalition for Digital Skills (promisingly inaugurated on 10 June 2016)[9] in promoting a large variety of initiatives aimed at increasing training in digital skills for the general workforce, for education, for ICT professionals, and for democratic participatory citizenship and civic engagement (Figure 2).[10]

[6] For further details, see www.oecd.org/education/SkillsStrategy. For a useful commentary, see http://oecdobserver.org/news/fullstory.php/aid/3777/OECD_Skills_Strategy:_The_pathway_of_choice.html

[7] "Soft skills" nowadays seem more important than ever; they arguably include a complex combination of capabilities, talents and competences, such as empathy, emotional intelligence, active listening, oral and written communication, public speaking, coping with work pressure and stress, time management, being able to create and coordinate human networks (online or offline), to name only a few.

[8] In sum, "while users grow rightly concerned about data privacy and misuse, the Spatial Web's use of blockchain in its data and governance layer will secure and validate our online identities, protecting everything from your virtual assets to personal files. […] As Spatial Web networks begin to associate digital information with physical objects and locations, products will begin to 'sell themselves'. Each with built-in smart properties, products will become hyper-personalized, communicating information directly to users through Web 3.0 interfaces" (Diamandis 2018). See also Mosco 2017.

[9] See https://ec.europa.eu/digital-single-market/en/policies/digital-skills

[10] The Greek Coalition for Digital Skills and Jobs is mostly interested in forging synergies among various partners (e.g. ICT enterprises, universities, research institutions and other entities). These partners "are bound to the aims of the Coalition through pledges, i.e. the commitment to implement vocational training, seminars and, in general, to enhance diffusion of digital skills to all citizens regardless of their level of ICT knowledge" (www.nationalcoalition.gov.gr/arxiki/).

**Figure 2:** *Greece's National Coalition for Digital Skills and Jobs* (source: http://www.nationalcoalition.gov.gr/)

This mainly involves a comprehensive and multi-level national plan which actively engages both the public and the private sector, aiming at mobilising various agencies and resources for conscious-raising, civic education, training and adult learning, as well as for analysing skills needs and for validating skills. The implementation of an effective digital agenda for crisis-ridden Greece will arguably encourage investments and help the productivity and the competitiveness of the country, thus discouraging the so-called "brain drain" (see e.g. Lazaretou, 2016) of valuable talent abroad.

Special emphasis is put on the future of work. By consistently implementing and reinforcing proper re-skilling and up-skilling strategies, the balance or adjustment process between job offer and demand would significantly improve and workers (such as IT practitioners) would have many more possibilities of ascending on the occupational ladder and getting better-paid and more meaningful jobs.

In the meanwhile, according to latest global estimates by the McKinsey Global Institute, robots could replace 800 million jobs by 2030, while the World Economic Forum (WEF) suggests that a "skills revolution" could pave the way for new opportunities.[11] Interestingly, a recent Pew Research Center survey shows that nine-in-ten adults in Greece voice intense worries that automation will make it harder for ordinary people to find a job, as robots and computers will take over many jobs now done by humans in the next 50 years (Figure 3). Greece is the only nation where more than half of those polled believe this will definitely happen.

[11] For details, see https://www.weforum.org/reports/towards-a-reskilling-revolution. The WEF Future of Jobs Report 2018 estimates that at least 133 million new roles may emerge globally by 2022, as a result of the new division of labour between humans, machines and algorithms (see https://www.weforum.org/reports/the-future-of-jobs-report-2018). Until then, however, more than half of all employees will require significant re-skilling and up-skilling. For relevant discussions, indicatively see Baldwin 2019; Schwab 2018; Swan 2017; Brynjolfsson & McAfee 2014; Helbing 2015; Mason 2015; Rifkin 2014.

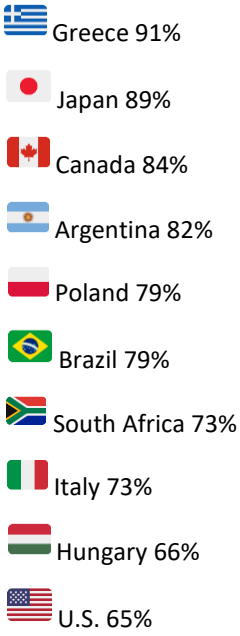


**Figure 3.** *Robots and computers will take over many jobs now done by humans in the next 50 years* (source: http://www.pewglobal.org/2018/09/13/in-advanced-and-emerging-economies-alike-worries-about-job-automation/)

**Upgrading humanism and democracy**

In the new Janus-faced era of radical futures, global existential risks (WEF, 2018; 2019), information filters, computational clouds, Big Data and Artificial Intelligence, liberal democracy ("the worst form of government, except for all the others", as Winston Churchill famously framed it) requires a shared culture of citizenship skills, responsible knowledge, progress and truth. Above all, they require close collaboration between stakeholders (at a global level) and between experts and non-experts, as well as participative smart citizens armed with technical, social and political know-how, in order to energetically reject hate speech and defend truth and collective values over against the large volumes of manipulative disinformation and "fake news" – the so-called *information disorders* (see e.g. Bounegru et al., 2018).[12] In particular, collective values constitute a precious source of shared prosperity and growth in the 21st century.

What it is thus urgently needed is to take a radically new path and collectively organise a fruitful, open and inclusive (stakeholdered) public debate about *where we want to go in the*

[12] In the EU context, see https://ec.europa.eu/digital-single-market/en/fake-news-disinformation. Arguably, the digital information environment tends to become toxic. The citizenry does not share a similar worldview anymore. Therefore, "gridlock and conflict become a very real possibility" (Nowak & Vallacher 2018, p. 19). Social media users often behave as like-minded believers who tend to create the virtual equivalent of gated communities (self-perpetual *echo chambers*), and are seemingly extremely vulnerable to digital demagogy, propaganda, manipulation, and fake news (see e.g. Sunstein 2017; Del Vicario et al. 2016; Boutyline and Willer 2017). In parallel, the valued profession of print journalism is gradually disappearing, thus "giving way to internet news sources on which it's difficult to distinguish fake news from genuine news, weakening a crucial safeguard of democracy" (Inglehart 2018, p. 205). Different kinds of *information disorders*, pertaining to different levels of complexity, obviously require different tactical responses.

*digital age*. To upgrade both humanism (humanism 2.0) and democracy (democracy 2.0), over against feudalism 2.0 or dictatorship 2.0, as well as to reach the next level of digital society, that is, a new *network ecology*, we must build a strong digital skills ecosystem, as a basic human right, common good, and public source (everyone can have access and get benefit from them). That is, a new dynamical ecosystem based on the fundamental liberal principles of *co-creation, co-evolution, and collective intelligence*, over against the obsolete principles of optimisation and top-down administration and control (Helbing 2015, 2017).

Digital skills education should hence be solidly based on a *human-centred*, *consensus-oriented* and, therefore, *other-regarding* decision-making tradition – namely, a spirit of conditional altruism (between egoism and naive altruism). Opening up liberal spaces of public dialogue is of utmost importance. The new education project should properly prepare citizens with a wide range of democratic alternatives, intervention points, a map of powerful actors and frameworks of critique (see Avin, 2019). It should also offer public participatory opportunities (Brailas et al., 2016), which can boost *collective digital intelligence*[13] and create new value (Brailas et al., 2017), individual happiness, pluralism, decentralization, transparency, accountability, trust, open institutions and social capital.

In the last instance, such valued social and political vision arguably calls us to effectively update Aristotle, that is, to radically move from knowledge and skills toward *digital sophrosyne*, i.e. a deep awareness of one's digital self or online presence, and *digital phronesis*, i.e. digital practical wisdom, the habit of making the right decisions and taking the right actions in the digital context. This would hopefully link technology with virtue in our turbulent, complex and fast-changing global environment.

## Conclusion

The concept of digital skills cannot be limited (or reduced) to technical features anymore. Bridging and linking social capital, which must be inseparably combined with strong human capital and inclusive institutional capital, is the fundamental democratic basis of social and economic well-being, not only at national level, but also at European and global level. That is why *we need to link digital skills with an agreed set of values, principles and rules*, such as diversity and non-discrimination, freedom and informational self-determination, participation and awareness, justice and solidarity, fairness and ethical responsibility, resilience and sustainability.

All in all, value-informed digital citizenship skills will help us effectively facing up and tackling adverse and nonlinear political developments, such as distrust, cynicism, authoritarian populism, polarisation, radicalisation, and extremism. But this also requires from the EU demo-

[13] Here, digital intelligence is obviously placed at *both* individual *and* collective level. According to Yuhyun Park (2016), digital intelligence (DQ) is a measure of competence in the digital media. It is a comprehensive set of technical, cognitive, and socio-emotional competencies that enable individuals and groups to face the challenges of and adapt to the demands of their everyday digital life. DQ consists of 8 broad areas: digital identity, use, safety, security, emotional intelligence, communication, literacy, and rights; across 3 levels: a. Digital Citizenship (the ability to use digital technology and media in safe, responsible and effective ways), b. Digital Creativity (the ability to become an integral part of the wider digital ecosystem by co-creating new content and turning ideas into reality by using digital tools), and c. Digital Entrepreneurship (the ability to use digital media and technologies to efficiently solve global challenges or to create new opportunities). For more details, see https://www.dqinstitute.org/what-is-dq/.

cratic system as a whole to proactively overcome the very real shortcomings that have systematically fuelled them, also emphasising what unites rather than what divides societies. Digital democracy must support society's historical achievements and concurrently cultivate a strong inspirational future vision. We can thus steer Europe beyond crisis, towards a new unprecedented (digital) era of shared prosperity and growth.

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