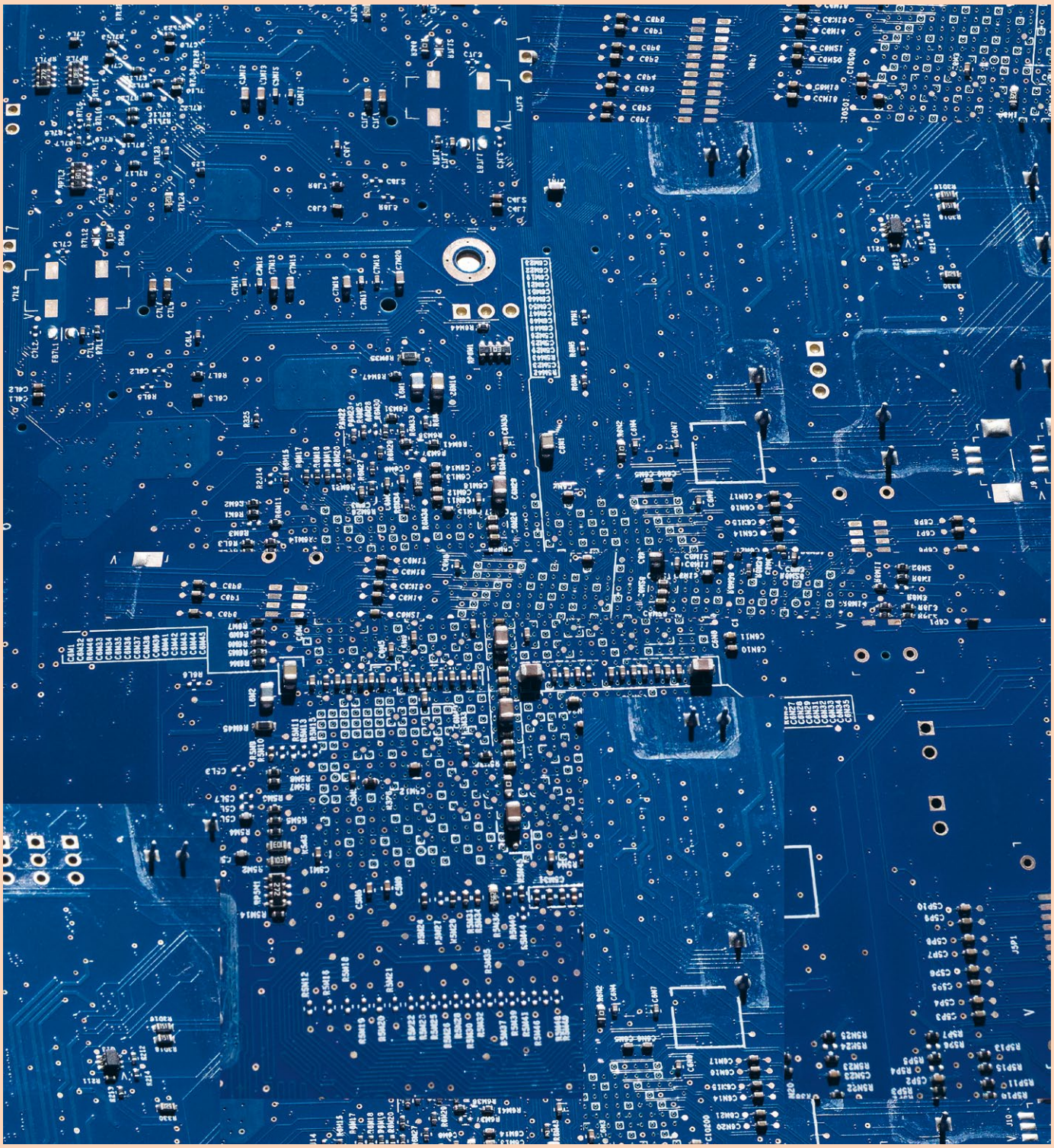
WORK IN THE AGE OF DATA

BBVA OPENMIND DATA, IDEAS, AND PROPOSALS ON DIGITAL ECONOMY AND THE WORLD OF WORK BBVAOPENMIND.COM



KEY CHANGES IN EDUCATION FOR THE DIGITAL ECONOMY

	Current Situation	Future of Education	Potential Impact
A FUNDING	Funding for education is covered by the individual or the **State government** in most instances. A1	Financial mechanisms of education will be collaboratively supported by **industry, governments**, and **higher education institutions**. Universal Basic Income and shorter work weeks may supplement this funding. A2	More opportunities for adult learning that are **work-place** relevant should emerge. **Quality education** in primary, secondary, and tertiary bands should increase. Access will improve. A3
B DURATION	Education is front loaded in the **first 25 years**. Professional and technical training is provided to some thereafter B1	Education is lifelong. **Work-learn** schemes will lengthen secondary and tertiary education. Adult training and reskilling will be constant. Badges and certifications will dominate verification of knowledge. B2	Physical **infrastructure** and **cyber-space** for learning will increase. Norms and cultures of learning will evolve in societies and in organizations. Many more educators are needed. B3
C HOW WE LEARN	Content is currently discipline specific, and insufficiently global. **Information transfer** is the purpose of primary and secondary education. **Pedagogy** and assessment has little individualized adaptations. **Emphasis** is on what you know, not how you use it. C1	Content is interdisciplinary and application of **knowledge** to real work settings and global context is emphasized. **Pedagogy** is individualized with aid of data and technology. Material coverage includes **wellness, resilience**, and **sustainability** in all subject areas. C2	Recall of content and ability to transfer to new context will be the norm where **quality education** is available. New metrics for competencies will exist, replacing tests of rote memorization. C3
D KNOWN UNKNOWNS	How access to technology will change cognitive capacities is unknown. **Neural implants, and other such technological advances in bioengineering**, could entirely disrupt the education sector as it is currently known.		

The Digital Economy and Learning

Nancy W. Gleason

Education is changing because the digital economy is shifting the skills and talents needed to lead a successful life and foster personal well-being. Talent gaps persist and are deepening around computer science and creativity. Learners need to be cognitively adaptive, and able to constantly learn new things and apply old knowledge to new contexts. Lifelong learning is the new normal. Three major shifts in education are identified: (1) changes in the funding of education; (2) changes in the duration of learning; and (3) changes in how we learn. Collaborations between industry, government, and education institutions will be the hallmark of education in the digital economy.

The digital economy is changing what we need to be able to do cognitively to lead successful lives and pursue well-being. Artificial intelligence, the Internet of Things, 3D printing, virtual reality, distributed ledger technology, biotechnology, and robotics are combining to change how we work and live.[1] Talent gaps persist and are deepening around computer science and creativity. The gig economy is changing employment and benefits structures around the globe as platforms enable people to share resources. Employment disruption is predicted to be considerable, though the pace of technological uptake, the nature of the welfare state, and the demographics of a given country will help determine the scale and duration of unemployment due to the automation of human work (OECD, 2018).[2] There will be new tasks and competencies in high demand. Higher education, in particular, will play a key role, in reskilling, upskilling, and educating the global labor force of the Fourth Industrial Revolution.

All that is technologically possible still may not be politically or economically rational or feasible.[3] This is why we are likely to see significant initial job displacement for the digital economy, regardless of what education institutions can do to upskill, reskill, and educate talent. The pace of change is such that there is likely to be considerable unemployment in the near term. Education institutors will be able to help individuals manage a transition to a new reality.

What is needed to thrive in the digital economy involves cognitive competencies matched with technological skills. The competencies are a shifting set of skills. Learners need to be adaptive, cognitively curious, and able to constantly learn new things and apply old knowledge to new contexts. The key to employability is cognitive adaptability. Employees will need to learn and unlearn constantly. Education systems need to prepare learners, both adult and youth learners: what I call, *learning resilience*. Learning resilience is about the ability to adapt with ease to new truths in your knowledge, repeatedly. It is about being accepting of your prior knowledge being rendered irrelevant under new circumstances.

The current global education landscape was designed to meet the needs of the Industrial Revolution that emerged in the 1850s with the mechanization of physical labor. There has long been a growing divide between graduate skills and employer expecta-

tions. For universities and high schools alike, there is a battle for time between soft skills and hard skills—or social-emotional competencies versus technical skills. There is resistance from academics, who see themselves as content knowledge experts who develop and verify knowledge, to teach vocational skills. Yet in countries where higher education is not subsidized by the government, the burden of debt students take on in order to be employed cannot be serviced or justified by content knowledge alone. The change is that universities are no longer the sole purveyors of information. Information is everywhere. It is what you do with information that matters. Furthermore, the jobs that are available in the digital age are shifting so quickly that technical degrees cannot guarantee preparation for the future of work. This is why learning resilience is essential.

This is not to say that education as we know it is obsolete; indeed, it is essential to inclusive economic growth. What do you want a formal education to deliver to your future employee? Many jobs require technical skills and that content has to be learned. You cannot do coding without calculus. You cannot model economic outcomes without sound econometrics skills. And you cannot conduct research in the social sciences without sound information literacy. These competencies have to be learned in order to perform the associated trade. Content is still essential. But it is insufficient. Primary, secondary, and tertiary education need to shift their focus to *how* to learn, not *what* to learn. And recruiters need to shift their metrics of talent to acknowledge soft skills, and resilience. Content knowledge is still essential, but it is what you do with that information that really matters.

Competencies are the current focus of good education, however, and the mainstream literature in this area is leading the charge. The current books coming out on what education should be in the digital economy advocate for a specific set of skills being developed by universities. Joseph Aoun, the president of Northeastern University in Boston, famously calls for creativity, entrepreneurship, and numeracy in *Robot-Proof* (Aoun, 2017). Angela Duckworth (2016) calls for grit in *Grit: The Power of Passion and Perseverance*. In one of the most important books on this issue, Erik Brynjolfsson and Andrew McAfee, in *The Second Machine Age: Work, Progress, and Prosperity in a Time of Brilliant Technologies* (2014), write that talent needs enhanced capacities in the areas of ideation, large-frame pattern recognition, and complex communication. And for the very high-end employee, Cynthia Solomon and Xiao Xiao have edited a 2019 volume with MIT Press, *Inventive Minds, Marvin Minsky on Education*, musing on how to develop inventive thinkers who can create. All of these publications offer important insights; however, none of them identifies the most important ingredient, though they are useful predictors and elements of leading a successful life in the digital economy and address ways in which education institutions can help get graduates there.

This has always been the approach of liberal arts Colleges. Liberal arts colleges, such as Ashoka University in India, NYU Abu Dhabi in the United Arab Emirates, Williams College in the United States, and Yale-NUS in Singapore, are developing truly global talent. They do this through small enrolment sizes per class, where undergraduates have access to the world's best researchers, and apply authentic learning with student-centered pedagogy. Real effort is made to integrate the messaging of global movements, such as the Sustainable Development Goals (SDGs), and this is made tangible through innovative curriculum and experiential learning in the field. These learning environments are designed and developed to help learners be comfortable with ambiguity, and to transfer knowledge from one context to another and apply it in new ways.

These colleges graduate a small number of students annually relative to the global labor supply. The liberal arts model is too expensive per pupil to scale up to address the anticipated hundreds of millions of people who need to be reskilled over the next decade or two. However, the liberal arts model, of interdisciplinary understandings of humanity's challenges, remains an excellent pool from which to draw on future-ready talent for the digital economy because graduates are taught to inquire, analyze, and create regardless of discipline, and to use a global outlook for addressing problems. These students are able to apply science, arts, and social science to strategic questions while developing social skills in an international setting. They have numeracy, digital literacy, and emotional intelligence. This is the thinker of the Fourth Industrial Revolution that we seek. The challenge is to scale its best attributes.

The "how" of developing these skills is expensive. There is simply not enough financial support currently being spent on education and reskilling in the public sector in most countries today. The scale of the talent gaps means industry needs to collaborate with government and higher education to implement a skill shift in the global labor population. Small classroom sizes are costly, but essential to students receiving quality feedback and access to the professor or high-school teacher. Experiential learning is well evidenced to bring students to authentic learning environments that allow them to apply content in the real world, aiding retention of material as well. This, combined with internships, enables students to get exposure to how the content of a course or major will play out in a given workplace or type of industry. The combination of these things allows a student to reach a higher order thinking that results in the ability to problem-solve and create new knowledge. Regardless of what area a student chooses to study in, they must be able to write, to communicate ideas clearly (both quantitively and qualitatively), and to understand how knowledge is created. Inside the classroom, having cutting-edge researchers who bring their work into the classroom helps students understand how knowledge is actually created. This is essential in the age of fake news, augmented imagery, big data, and algorithm bias.

Three Major Shifts in Education for the Digital Economy

The three major changes coming for education as outlined below are based upon exposure to literature, private sector reporting, and practice around the globe. It is important to highlight the governance structures, economic stability, labor relations, and the uptake of technological advances as relevant context for each country and educational institution. Three major shifts in education are identified: (1) changes in the funding of education; (2) changes in the duration of learning; and (3) changes in how we learn. The following sections will walk through each major shift for the future of education.

1. Funding Mechanisms for Education

The biggest change that will come to the future of education is more deliberate engagement between industry, government, and educational institutions for funding

learning and talent development. This was clearly called for in Klaus Schwab's *The Fourth Industrial Revolution* (2016) and continues to be championed by the World Economic Forum. There is a well-established link in the literature between economic development and education of the population. Governments need people to live, work, and earn, in order to maintain various different kinds of social contracts. Amanda K. Oleson and colleagues in a 2016 book with Harvard Education Press, *Beyond the Skills Gap: Preparing College Students for Life and Work*, advocate for employers sharing responsibility with the education sector for preparing students to work in the digital economy. If this does happen that will be an excellent change for education in the future digital economy. Industry will have to help pay to reskill and educate differently the global labor pool. This also involves paying to reskill teachers and professors too. The cost is part of the reason for the need in change of funding flows; the scale of the number of people is the other reason for the needed change. McKinsey Global Institute anticipates that nearly 1.2 billion people are currently working in automatable jobs. This is not to say that they will lose their jobs, but nearly all of them will be tasked with doing different work within their organizations in the coming decade. Yes, technology produces opportunities for financially efficient solutions, but in this case, not fast enough. Employers need to assist governments and education institutions to upskill and reskill the workforce.

Around the world, access to quality education is a challenge regardless of the digital economy. For those who do make it to and through higher education, the issue of funding is prohibitive. In the United States, the Federal Reserve claims that Americans are carrying $1.5 trillion in student loan debts in 2018. A full fee-paying student at Harvard University can expect to spend $78,000 a year in tuition, room and board, fees, and living expenses. In Europe fees are considerably lower; in Spain for example, public university fees range from €2,000–€3,500 per year, and private universities vary between €5,500–€18,000 per school year. In Argentina, higher education is free, but schools are overcrowded and quality can suffer as a result. In India, there are simply not enough seats to the order of millions of youth not having an opportunity to attend tertiary education. This is untapped talent. This is untapped economic opportunity. This is squandered well-being.

The gap between the haves and have-nots will continue to grow, especially along gendered lines, as computer access will determine potential for success in education and employability. It remains to be seen which, if any countries, will adopt some form of "universal basic income" for wealth distribution, or if most countries will go to a four- or three-day work week without pay decreases to address the growth in capital profit and corresponding decrease in human profit. Relying on philanthropy and tuition for higher education will need to change, and tax dollars alone will not be able to fund public education exclusively in welfare economies.

The final reason the funding mechanisms need to change is that lifelong learning demanded by the digital economy means that front-loading our education to the first fifteen to twenty-five years of life is no longer a sufficient model. This will be discussed in greater detail below, but it is important to note here that we will all learn throughout our lives from here on out. That change in education is now, not in the future. For adult and corporate education, it is not effective to purchase a course on critical thinking for your employees. You cannot develop resilience and creativity in a three-day training course. Learning to connect ideas and create solutions in novel ways takes time and funding to develop. A commitment to a resilient and effective workforce means providing financial support for lifelong learning from governments, industry, and education institutions. This includes funding research in the learning science as it pertains to adults particularly. It is anticipated that this field of study will be vitally important in the years and decades ahead. Indeed, funding such research could reflect corporate social responsibility.

2. Duration: Lifelong Learning, Upskilling

Education will no longer be front-loaded in the earlier years of life. Education is now a lifelong endeavor where people will have to learn, unlearn, relearn, and learn again. Lifelong learning is essential to survival and thriving in the digital economy. People can learn new facts and gain more knowledge, or they can learn how to do something through instruction of a given skill; or they can learn why something matters which can inspire creativity and drive success. Every organization needs a learning culture that

Primary, secondary, and tertiary education need to shift their focus to *how* to learn, not *what* to learn. And recruiters need to shift their metrics of talent to acknowledge soft skills and resilience

Small classroom sizes are costly, but essential to students receiving quality feedback and access to the professor or high-school teacher

Students from N High School, an online school launched in Japan in 2015 to develop the vocational skills of its students, who are all digital natives. In the photo, students in a distant city watch a video broadcast of the ceremony to mark the start of the school year at the main campus in Okinawa

is based on growing and improvement. High performing teams will be composed of those who know how to learn, and not what to learn. Cultures of growth and change need to be embedded to access in schools and in the workplace.

The pace of technological change shifts too quickly for talent development to stop at the age of twenty-five or younger. What we need to know shifts too quickly. And the millions of new jobs that will come into existence will demand technical and social skills we cannot predict at any given time. Lifelong learning is costly, which means governments and industry need to help subsidize it to keep the economy going. Executive education is likely to skyrocket in scope. Likely education institutions in the private sector that can offer badges and certifications of knowledge will be new players in the adult education sector in a way they have not been before.

Furthermore, as reported by the OECD in 2018, pay-compensated reduction in working hours may be a regulatory tool that can compensate for loss in income due to creative disruption of jobs. In this scenario, and the one of universal basic income, people will be freed up to learn new things. More hours of the week can be spent learning. This change in social structures will change how corporate education and training can work. There will be more capital to invest to make the education of adults a reality and a consistent practice.

The OECD has developed a Learning Compass as part of its Future of Education and Skills 2030 project, and seeks to guide education systems across the world to enable students to thrive in seeking well-being in the future. The Learning Compass, as shown in fig. 1, details ways of thinking rather than specific competencies and content knowledge. There are other such schematics being developed by comparable global agencies, as the world grapples with a major shift in what is needed in the workforce, today and in the future. The point is that how we prepare thinkers who can adapt to constantly changing environments is no longer front-loaded in the first twenty to twenty-five years of life, and rote memorization is entirely insufficient for a viable employee. Education centers, both private and public, will work to ensure that learners know how to think and learn, and this is key to their success and long-term well-being.

The schematic of fig. 1 is helpful in understanding how people will best learn for successful lives. In the classroom, this means education will have to better leverage technology to both access more learners and free up human educators to do what they do best. This means grading will likely be automated in the near future. Algorithms are biased, but there are patterns we can identify and correct. For humans it is much harder to correct for implicit bias. Technology can deliver lectures, curate content, and mark assessments. Educators will need to learn how to facilitate learning, rather than simply share their knowledge. Student-centered learning is essential. Classrooms and online activities should be authentic and relevant to the students' interests. Where economically and

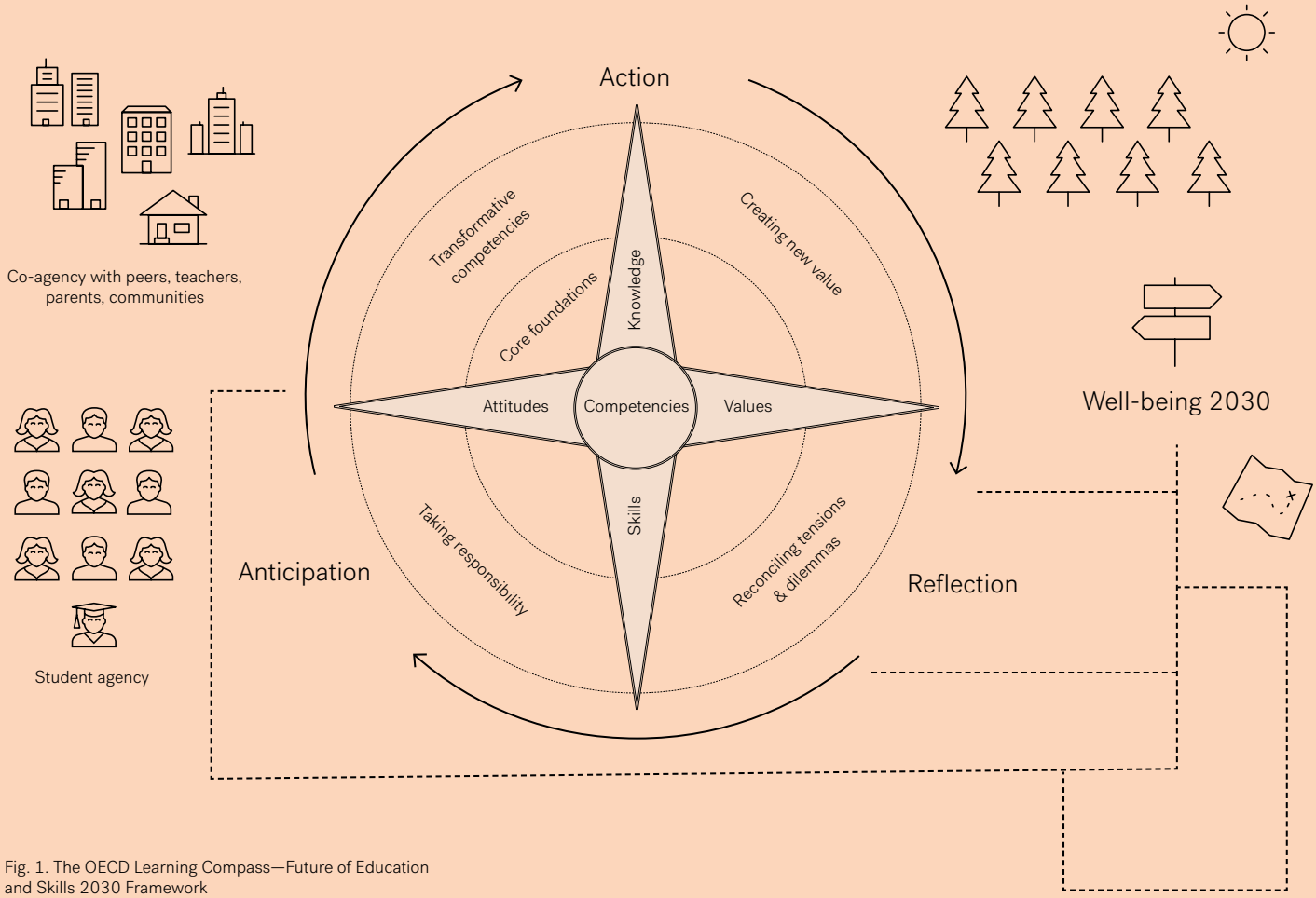


Fig. 1. The OECD Learning Compass—Future of Education and Skills 2030 Framework

The OECD Learning Compass 2030 is a learning framework that aims to help students navigate towards future well-being. It creates a common language about broad education goals

physically possible, students should be taught in small, diverse groups, regardless of age.

Workplace upskilling and reskilling of current employees will be a key feature of corporate action in this area for the medium term. This is also important in the longer term as GenZ employees seek firms who can offer valuable development opportunities relevant to the gig economy. Visa corporation is a great example of what this change should look like for larger firms. Visa University now has two physical campuses: one in Foster City, California, and one in Singapore in their Southeast Asia headquarters. They also have a massive online digital campus which is learner driven, rather than being compliance driven, as they had been before. They have also hired a chief learning officer, Kerie Willyerd, who is the co-author of *Stretch*, a book about how to develop peoples' skills in the automation economy. All of this is intended to develop a learning culture across the organization, one that is trackable with data and strategically aligned to the organization's business goals and ethics. Larger firms will all need to take such measures to keep their current employees—who are valuably aware of the corporate culture already—and develop their new ones. Visa is also making money off its talent, running Visa Business School, which offers online courses, interactive workshops, and custom training in all areas of the payments industry. They have wisely positioned themselves to be a key player in education for the digital economy within the payments industry and beyond.

3. Changes in How and What We Learn—Technology and Education

The schools with the appropriate funding are making exciting strides in education. While sitting in their classrooms, students can visit a faraway archaeological dig, or a museum, or a hospital, through virtual reality. Students can wear virtual reality goggles and be propelled into a sustainable world where environmental degradation has been reversed. Students can 3D-print a series of molecules in a chemistry class to understand the scale of the atoms relative to each other. And they can watch an algorithm-produced video of a deceased poet from centuries back read their poem aloud. Augmented and virtual reality are changing what is possible in the classroom. Access to laptops and iPads gives educators real-time data about student understanding in their classrooms. Simulations allow nurses and doctors to practice surgery without a cadaver. When technology is available, it alters the relationship between the educator and the learning. Individualized, self-directed learning for students becomes possible. Content is transferred online, outside of class, and then the in-class time can be spent reviewing and learning to apply the material. This blended learning model is likely to be the new norm, as evidence suggests this is the most effective way for people to learn.

Virtual reality (VR) is already allowing those with access to learn anywhere about everything. An example of the technology being brought to bear on this is a firm called VERE360, which develops research-based education products in virtual reality so learners do not have to travel. This approach is also useful as it breaks away from traditional adult training because it better engages the learner. The goal of this firm is to deliver products in VR that help learners understand complex issues and topics that are difficult to understand, such as the complexity of climate change, or mental health. The technology deployed by firms such as VERE360 enables the personalization of corporate and classroom learning and intends to deliver the learning in a shorter time and a more engaging manner than traditional training. VERE360—and its competitors—are working to produce global content on social issues for socially drive organizations and education institutions on less expensive hardware. Hundreds of millions of people in the global workforce need exposure to this technology in order to be competitive and thrive in the digital economy.

In the opposite direction, the Hickory Hill Nature School in Connecticut, USA,[4] is an outdoor school where children are immersed in all-weather learning, whereby there is no indoor space. The purpose is to foster a deep and personal connection to the natural world. Inquiry-based and child-led, with small class size, the pedagogy aligns with evidence-based best practice for developing creative and cognitively flexible learners who are well connected to nature and sustainability. This is the primary and secondary version of liberal arts college without the technical skills scaffolded into the curriculum *per se*. These sorts of school will likely proliferate in the digital economy as employers and parents seek to foster creativity and retreat from the numbers of learning. This type of learning will be valued in the future (currently there are only two such schools accredited in the United States) because it delivers a connection to

Industry will have to help pay to reskill and educate the global labor pool differently. This involves paying to reskill teachers and professors too

The final reason funding mechanisms need to change is that the lifelong learning demanded by the digital economy means that front-loading our education to the first fifteen to twenty-five years of life is no longer a sufficient model

nature that artificial intelligence will likely not possess, and because it is evidence-based best practice for fostering stewardship and emotional intelligence.

Assessment and grading are also being automated. When testing children, there are now ways to apply adaptive computer-based testing that allows each learner to demonstrate their academic proficiency at their own pace. Eric Mazur, Harvard's world-renowned physicist and expert teacher, has developed Perusall, a software application that grades students' reading annotations. Learning simulations will eventually be able to replace the teacher as the deliverer of content. How we certify knowledge will shift accordingly. Global talent will be able to badge itself in different ways and, hopefully, much less expensive ways.

The automation economy and the digital technologies that have brought it on will also influence changes in secondary and tertiary curricula. STEM and STEAM (Science, Technology, Engineering [Art], and Mathematics) remain very important, and produce talents that are in high demand in the workforce. However, environmental pressure mounts from the climate crisis as well. Students of the automation economy are also students (young and old) living in a time of ecological breakdown. Education institutions will need to adjust their curricula to help people grapple with the science, humanity, social impacts, and solutions. A good education will combine automation and environmental sustainability in the years and decades ahead. And an excellent education will produce resilient learners who can adapt to change effectively.

Online learning will have to be a part of the solution given the scale of the technologically displaced in the short and medium term. While Massive Open Online Courses (MOOCs) have not delivered the learning they were first purported to, the idea that learning can happen online in the absence of brick-and-mortar access to quality education is important. The number of humans who crave access to quality education is just too large to ignore the online model of free, open-access information. In the future, we will do better at leveraging this tool.

A curricular topic that will likely be added to formal and adult education is mindfulness. The stresses of constant change and better awareness of mental health means that

Students of the automation economy are also students (young and old) living in a time of ecological breakdown. Education institutions will need to adjust their curricula to help people grapple with the science, humanity, social impacts, and solutions

A march for teachers' salary increase and against budget cuts in Argentine public universities, Buenos Aires, August 2018

education about how to self-regulate and practice self-care will be a societal must. Current models of education require the fortunate to access this support in their own time and within their own financial means. Very few can do so. But sleep, mediation, and nutrition will become vital education pieces in the digital economy. Not only for our mental well-being, but also because we will be living much longer lives in the digital economy, and self-care will be paramount as a result.

Unknowns of the Future of Education

Technology also changes the learners themselves. iPhones, social media, and the culture of the Internet has changed the human attention span, for example. Most people turn off after eight seconds. But this is a change that has not involved the alteration of the human body. Wearable technology is changing how students engage in the classroom and in athletics in schools. In the future, biometrics will likely tell education administrators about individual learning as real-time health data enters into the education process. What is unknown is how cultural sensitivities to privacy will influence the use of such technologies in schools. Where the technology is available and financially supported, will administrators and parents opt to use it? It remains to be seen if employers would have the legal right to use such technology.

At the more advanced end of the technology advancement spectrum, it is possible that people will be using implantable brain-computer interface (BCI) technology, or brain implants, to enhance their knowledge base. With this outcome, education as we know it would fundamentally change. There would be substantial equity and access issues to grapple with from the start but, nonetheless, the possibility of this eventuality is real. Elon Musk's NueraLink company is working to develop implantable chips that would give the human brain artificial intelligence capacities. These people will be cyber-physical systems in their truest sense. How they are educated will depend on the neuroscience and psychological advances we can make as a society in the coming years. In addition to the access and equity issues involved, there will be significant ethical issues as a result of this new kind of intelligence and what it is *allowed* to learn.

The difference between machine probability and human creativity is real and will remain so, but how education institutions will teach people about the difference is little explored at this time. Likely, ethics training will be essential for global talent regardless of your industry or profession. There is very little, if any, preparation in the education world for this sort of technological change in how information is ascertained by humans. Nonetheless, it is an eventuality that is best placed in the long-term planning of a given organization, educational institution, and government.

These changes have fostered renewed interest in the sciences of learning all the more imperative. As MIT has reported in its report *Work of the Future, Shaping Technology and Institutions, Fall 2019 Report*, these changes require a better understanding of how adults learn. Research is currently being done to connect the science of learning to workplace adult learning in practice.[5] It remains unknown how learners of different ages and educational attainment learn best, let alone how cultural context may impact that learning. This will be an area for important research and discovery going forward.

Conclusion

The digital economy is changing what is needed in terms of education to lead a successful life with well-being. Access and quality will continue to be challenges in the digital economy, but there are new opportunities in both areas due to the changes that technological revolution brings. New collaborations between governments, education institutions, and industry will foster a new area in education that is lifelong and technologically enhanced. There are known unknowns to consider in long-term planning, most notably the potential for neural implants changing how humans interact with information cognitively. Education in the digital economy will change in its funding structures. Education and learning will change in duration, no longer being front-loaded in the first decades of life. And education will be changed by technology itself, not just in the ways we deliver information and learning, but also in what is actually learned. Environmental sustainability and well-being will need to be understood by all for a successful life of wellness in the digital economy. These are exciting times for change, but to ensure the outcomes have a net positive impact on society more concerted and deliberate effort around education needs to be pursued by all stakeholders. The costs of not doing so appear to be dire.

Nancy W. Gleason, PhD is the inaugural Director of the Hilary Ballon Center for Excellence in Teaching and Learning and an Assistant Professor of Practice in Political Science at New York University Abu Dhabi. Previously, she directed the Centre for Teaching and Learning at Yale-NUS College in Singapore. In her role she guides faculty in the pedagogy of liberal arts education which transfers interdisciplinary competencies for a digital economy, such as critical thinking and creativity. Her research has focused on climate change and the Fourth Industrial Revolution's implications for higher education, workforce training, and the future of work. She has published and consulted widely in these areas and is the editor of *Higher Education in the Era of the Fourth Industrial Revolution* (Springer, 2018). She holds a PhD from the Fletcher School of Law and Diplomacy at Tufts University, an MSc from the London School of Economics, and a BA from George Washington University. @NWGleason

Notes

1. See Gleason, 2018, "Introduction", p. 1.
2. OECD, 2018, p. 3.
3. Ibid.
4. See https://www.hickoryhillnatureschool.org.
5. See the 2019 MIT report under Autor et al., 2019, p. 39.

Select Bibliography

—Aoun, Joseph E. 2017. *Robot-proof, Higher Education in the Age of Artificial Intelligence*. Cambridge: MIT Press.
—Autor, David, Mindell, David M., and Reynolds, Elisabeth B. 2019. *Work of the Future, Shaping Technology and Institutions, Fall 2019 Report*: MIT Work of the Future.
—Brynjolfsson, Erik, and McAfee, Andrew. 2014. *The Second Machine Age: Work, Progress, and Prosperity in a Time of Brilliant Technologies*. New York: W. W. Norton.
—Duckworth, Angela. 2016. Grit: The Power of Passion and Perseverance. New York, NY, US: Scribner/Simon & Schuster.
—Gleason, Nancy W. (ed.). 2018. *Higher Education in the Era of the Fourth Industrial Revolution*. Singapore: Palgrave Macmillan.
—McKinsey Global Institute. 2017. "Harnessing Automation for a Future that Works." Available at https://www.mckinsey.com/featured-insights/digital-disruption/harnessing-automation-for-a-future-that-works.
—OECD. 2018. "The Future of Education and Skills: Education 2030." Available at https://www.oecd.org/education/2030/E2030%20Position%20Paper%20(05.04.2018).pdf.
—Oelsen, Amanda K., et al. 2016. *Beyond the Skills Gap: Preparing College Students for Life and Work*. Cambridge, MA: Harvard Education Press.
—Schwab, Klaus. 2016. *The Fourth Industrial Revolution*. New York: Crown Publishing Group.
—Solomon, Cynthia, and Xiao, Xiao. 2019. *Inventive Minds, Marvin Minsky on Education*. Cambridge, MA: MIT Press.
—Willyerd, Kerie, and Mistick, Barbara. 2016. *Stretch: How to Future-Proof Yourself for Tomorrow's Workplace*. Hoboken, NJ: Wiley.

OpenMind
BBVA

NANCY WEBSTER GLEASON

LISTEN TO THE ARTICLE HERE

READ THE FULL BOOK

- Work in The Age of Data
- El trabajo en la era de los datos

HOW TO CITE THIS ARTICLE

Webster Gleason, Nancy. "The Digital Economy and Learning."
In Work in the Age of Data. Madrid: BBVA, 2019.

ARTICLE IN SPANISH

- La educación para la futura economía digital.

RELATED ARTICLES

- Futures of Education for Rapid Global-Societal Change, Jennifer M. Gidley
There's a Future: Visions for a Better World.

- The Internet and Education, Neil Selwyn
Change: 19 Key Essays on How the Internet Is Changing Our Lives.

- From the "Imagined" to the "Post-bureaucratic" Region:
The Search for Europe in Higher Education Policy, Robin Shields
The Search for Europe: Contrasting Approaches.

ALL THE OPENMIND COLLECTION TITLES