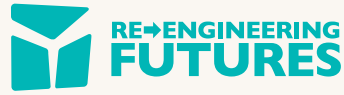




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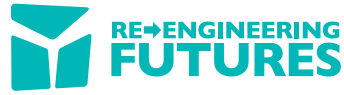


Global Education Futures Report

EDUCATIONAL ECOSYSTEMS FOR SOCIETAL TRANSFORMATION



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EDUCATION
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EDUCATIONAL ECOSYSTEMS FOR SOCIETAL TRANSFORMATION

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sessions in 2014-2017

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THE GLOBAL EDUCATION FUTURES REPORT FOREWORD

PETER M. SENGE

January 1, 2018

*"In the 20th Century 200 million people
died through wars.
Clearly something is wrong with our
system of education."*

HH DALAI LAMA

When I first heard the Dalai Lama make this statement in a program we were both part of in Vancouver a few years ago, like most in the audience, I was taken aback by its simple logic. If we are concerned about problems in our world, we must look upstream. It is easy to blame problems on sources outside of our control: an economy that generates extraordinary wealth and growing poverty, worsening social and cultural divides, and historic ecological imbalances that literally threaten our, and many other species,' future. But these problems are not bad luck. They are not random or unpredictable. They are the predictable side effects of a way of living that has no future. We humans today are profoundly confused. We take continuing material acquisition as the definition of happiness. Our governments focus on economic growth so as to continually expand material affluence as a surrogate for meaningful indicators of well-being. And, we concentrate enormous political power in small cliques with the sole interest of sustaining the journey to where no one really wants to go. Sitting at the heart of this way of living is an education system designed to stoke the engine, to graduate students who can march behind their predecessors to "good jobs" and keep the production-consumption cycle humming. As The Dalai Lama implied, it is naive to think that sort of changes needed in our societies will ever occur without deep shifts in our prevailing system of education. When asked what he thought was wrong with modern education, he responded, "We seem to be very good at educating the mind but not the heart."

Our system of education is trapped in an unspoken irony: the institution with the greatest potential impact on the future is arguably the one most shaped by taken for granted ideas from the past. No one would expect a technology-based company to develop products as its predecessors did 30 years ago, let alone to produce the same products. Yet, we all expect an algebra class today to look much like what it looked like when we were students. The teacher should be in front, in control of the class. The students should be quietly listening, seated behind desks aligned in neat rows. There should be an orderly structure to the day organized around a clear pre-determined curriculum for the year. Oh yes, there might be a few more gadgets like students with iPads and internet access, but these are little more than new bells and whistles added on to a vehicle that is largely unchanged.

Many years ago, an great inspirer of the journey many of us have been on around “systems education,” Gordon Brown, former Dean of the Engineering School at MIT, taught us that, “To be a teacher is to be a prophet. We are not educating students for the world we grew up in, not even for the world that exists today, but for the future they will live into, a future that we can barely imagine.” Gordon knew whereof he spoke, having been an instrumental part of a fundamental shift in engineering education seventy-five years ago. Guiding the transformation was a simple idea: a growing mismatch between the prevailing model of trade education based on established skills and an accelerating pace of advance in science, which would render more and more of those skills obsolete within a person’s career. The answer was to transform engineering education to be based on solid training in the science that sat behind the engineer’s work, so that the person could stay abreast of their field as it advanced.

Basic innovation in all forms of education today must likewise be guided by simple compelling ideas. This report sheds a light on one: the renaissance that is occurring in education around the world as more and more people see the profound mismatch between the prevailing industrial age models and the reality of learners today. This means much more than just “fixing schools.” The sort of leap of imagination Gordon Brown demanded of us means rethinking education as a prime avenue for shifting culture, that school could be a vehicle to help shape the society we want to create through learning how to learn together. It means embracing the extraordinary challenges of unprecedented rising global demand for education with a response fit for the future not the past. It means accelerating the shift already occurring from traditional schools focused on traditional skills to education focused on helping students learn how to work together to solve complex problems that have no simple solutions but require creativity and a capacity for never-ending learning? It means an education system rooted in cultivating human beings who feel connected to one another and

to addressing the challenges of their society, not just producing “graduates” with the skills of the past, prepared for jobs that no longer exist. And it means finding ways to support the growing network of teacher-innovators who are moving from the front of the room delivering prepackaged content to the “middle of the room,” learning with and from their students.

In our own work, educating the heart has come to mean embracing profound interconnectedness as a guiding idea transforming how we understand self, other, and our place in the larger world. This starts with seeing ourselves as an interconnected “mind-heart-body,” as they would say in Chinese wisdom traditions, rather than the “neck-up” focus of traditional schools. Where in the journey of school do I come to learning about myself, what truly matters to me, my sense of personal purpose? How does appreciating the sources of my own well-being shape how I learn? How does learning how to quiet the mind support my learning, and better understanding how my emotions can be both generative and destructive? Embracing inter-connectedness extends naturally to re-envisioning the inescapable and often neglected social dimensions of learning - the world of relationships, friends, family, and teams. How does cultivating compassion enhance intelligence? How does learning how to learn together? How do students’ understandings of a subject deepen when they are helping one another in learning it? What does it mean to integrate developing “relational competencies” with the more technical competencies that are often the sole focus today?

Last, how do we see ourselves within the larger systems in which we are inescapably embedded? Native people are fond of saying that one’s first relationship is with Mother Earth. If that relationship is weak, all others will suffer. What does this mean for the growing majority of children who grow up in cities with little or no sense of the larger natural world? As our human footprint becomes ever larger, there is increasing need to appreciate the effects of our actions across space and time. How do we develop a sphere of compassion that matches our sphere of impact, rather than simply focusing our concerns on “me and mine,” the short-term and the local? All too often, students today feel they are standing on the sidelines as the larger issues like climate change and poverty that will shape their future unfold – how do we help students develop a sense of efficacy and personal engagement around “global” issues like food and water, which are also unfolding in their own “backyards” as well?

One of the defining features of the modern age is the gap between our impact and our commitment: while our impacts on the natural and social world are without precedent, if anything we are more and more focused on the short term and on self-benefit versus benefit for others and life more broadly. For much of human history, societies operated with a shared aware-

ness that helping others was essential for reciprocal benefits to ourselves – the pragmatic underpinnings of all ethical systems – this complex web of shared concerns has been displaced by the culture of consumerism, accelerated in recent years by social media.

Of all society's core institutions, education broadly conceived has the greatest potential to close this gap.

About this Report

As the 21st century unfolds, humanity is facing unprecedented opportunities and existential challenges never before seen in the history of our species. As our technological achievements continue to evolve at exponential rates and our human systems span the globe, we are increasingly empowered to create futures that work for the whole of humanity and the biotic community with whom we share Earth. At the same time, we are experiencing global-scale environmental, socio-economic and cultural dynamics that increasingly jeopardize the continuation of our society and even the life on our planet as we know it. Both the challenges and opportunities of the 21st century are creating immense pressure on human systems to evolve to meet the needs of today and provide a healthy human legacy for future generations.

The journey of Global Education Futures began with the understanding that educational systems around the globe, like all other human systems (economies, politics, food, resources...), have entered a stage of flux and intense pressure to evolve to meet the needs of the learners of today and tomorrow. In this context, dominant educational models are increasingly perceived, by learners and society, to not meet current and future needs. Furthermore, the gap between educational agendas and learners needs will only continue to widen in the coming decades if action is not taken now. In order for humanity to rise to the occasion of our moment in history it is imperative that we evolve our educational systems to cohere with the complexities of the future. Conventional and incremental change will not address the magnitude of the crises we face. What is needed is a paradigm shift in education toward models that are relevant for the 21st century and beyond.

This report is the culmination to date of Global Education Futures (GEF) explorations of how to design, prototype, and evolve educational systems and build learners capacity to co-create thriving futures while collaborating globally in a complexifying world. Created in 2014 as an international platform bringing together shapers and sherpas of global educational systems,

Global Education Futures provided a forum for international dialogues and collective creativity sessions in the US, Russia, European Union, Asia, Latin America, South Africa, and New Zealand. Educational trendsetters and trailblazers came together in curated and facilitated groups to explore and articulate the desirable and possible futures of learning for individuals, communities and our civilization. These sessions engaged more than five hundred global educational leaders from over 50 countries, as well as representatives of global agencies such as OECD, UNESCO, World Bank, ILO, WorldSkills, and others. Three of the primary questions throughout this collaborative journey have included commitments (1) to understand the new social and economic realities of the 21st century, and what skills and knowledge will help children, adults, and seniors to lead fulfilling and thriving lives, (2) to explore what learning models can serve individuals and communities in their learning journeys throughout their whole lives, and (3) to understand how educational systems can support human flourishing and be a avenue that will transform our global society toward long-term resilience and thriving for humanity and the biosphere.

Through many collective vision building sessions the authors of this report have condensed this global work presented in the following pages as a distributed team of authors, meeting during GEF sessions in Germany, Cyprus, Austria, Argentina, US, and writing from Moscow, St. Petersburg, Buenos Aires, Arizona, and Colorado, honoring the spirit by which this vision has been co-created; as a living, evolving, and open-source representation of the emerging future of education.

Where We Begin & Where We Are Navigating Toward

We begin from the understanding that learning is our birthright and education is a fundamental human right. We see our time on Earth as most opportune for needed transformation. In that spirit, we see that the future is here for the making. We aim to play, work and co-create a vision for future education and prototype communities and labs for societal transformation through education and learning, while being the embodied living model of the future now.

We witness and identify a spectrum of pressing needs in educational systems, and seek to embolden learners and leaders toward an exploration of transdisciplinary and holistic perspectives, personal resonance, envisioning, and a sense of greater worldview and greater purpose of service to humanity – and indeed, to the flourishing of all life on Earth. We trace and teach the finer processes of listening into the world around and within us; prospecting knowledge out of data; deriving wisdom from knowledge; and expanding knowledge through care and a greater sense of love.

We sense that education can no longer only be a linear progressive path of amassing information, proving scores, certifying employable skills for the accumulation of social status in predictable and prescribed forms. Let us then teach and learn about natural phenomena and how to live in and with nature well and explore historical facts and the laws and patterns that govern social forces and processes so we can shape the future together. Let us teach and learn science, technology, engineering, art and mathematics and demonstrate the generative power behind their symbols. And, truly let us learn together about emancipatory relational education, such that when we teach and learn about sexual education, for example, we discuss the power of love, practices of genuine emotional self-care, the finesse of intimacy and intricacies of relationships so that we may live together well.

We cultivate systems of education based in evolutionary processes of learning that respond to our inherent drive toward experiential and holistic development, attend to the phases of life and one's life span, and

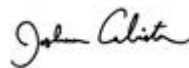
honor individual significance by activating the impulse toward service and collective contribution. We enable education with a focus on transformational processes that take the data of the senses and contemplative and interpretative powers of different faculties and refine them with imagination and vision, while ennobling such education with the care for all life forms, our home, Earth and a commitment to contribution and legacy of the greater evolutionary continuum of all life on Earth.

We are future-and-globally-focused and compassion-and-locally attuned. We foster intellectual and leadership gathering places and experimental, prototyping labs for systemic innovation in which transformational education, cultural diplomacy, transdisciplinary research, ecological literacy, personal growth, and social change practices can be shared for our collective potential.

We invite creatives, visionaries, policy makers, and those dedicated to systemic educational change to join the emerging global commons of learners, planetary citizens, and change-leaders uniting as evolutionary learners and leaders in a global community that works together on and for designing and delivering a broader and more relevant vision – education with interconnected societies for a shared future. We envision, engender and enact a new culture of learning that addresses, supports and develops the core existential aspects of a human life: sense of being, becoming and belonging and the sacrosanct celebration of life.



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Joshua Cubista



Alexander Laszlo



Mila Popovich



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1

INTRODUCTION: A PARADIGM SHIFT

Education will be concerned primarily with exploring to discover not only more about the universe and its history but about what the universe is trying to do, about why man is part of it, and about how can, and may man best function in universal evolution.

BUCKMINSTER FULLER

1.1 Education in a Time of Transition¹

We are living in a time of accelerated, global, complex change, in which our human society faces increasing pressure to evolve our systems and processes to meet the demands of the 21st century and beyond. Education is the most sophisticated social technology of societal transformation and intentional evolution – yet it is still a widely underutilized pathway for co-creating and contributing toward sustainable, regenerative, and thriving futures within and beyond our biosphere. Education can become an avenue through which global society will overcome the gaps and barriers we have created: the digital divide², the imbalance of information flows³, the growing economic and social inequality, religious, ethnical, and cultural divides, and extreme ecological pressures we are placing on the Earth. Yet our educational systems are still designed for the world of yesterday – and so they must be changed to meet the demands of the future, including increasing social, ecological, and economic complexity in all domains of human life. It is necessary to re-imagine the purpose and the design of education in the here and now; what is needed is nothing less than a renaissance of both human values and vision in action transforming human learning and leadership that fosters lifelong learning and “right livelihood” for a healthy world. Unless we re-design our ability to learn together in a way that cultivates our collective potential, we diminish prospects of the continuation of the human experiment on Earth.

There is a continuously growing demand for better education around our planet. According to UNESCO, there still remains around three quarters of a billion illiterate people in the world⁴, mostly in developing countries of Africa, Asia, and Latin America⁵ – and one of the UN Sustainable Development Goals is to “ensure that all youth and a substantial proportion of adults, both men and women, achieve literacy and numeracy”. The global demand for higher education continues to grow, with an estimated additional 95 million students by 2025, an equivalent to founding 3 new universities every week for the next 10 years [Jacobs, 2014]. According to Hay Global Skills Index⁶, a growing skills mismatch remains one of the key problems of the job markets for the majority of large economies of the planet. Even in its current shape, the educational sector will remain one of the most flourishing sectors of our society – and its main tasks in next decade will be the expansion of educational institutions capacities, the development of new curricula that better match demands of the job market, and the reduction of instruction and training costs through new educational technologies.

¹ Consult Glossary at the end of this document for terms introduced or redefined in the Report.

² According to ITU (UN specialized agency for ICT), nearly 4 billion people still do not have access to Internet and digital technologies – including parts of population within the developed economies such as the US, Germany, South Korea, and others <http://www.itu.int/en/ITU-D/Statistics/Documents/facts/ICTFactsFigures2016.pdf>

³ Divide between regions & communities that are inundated with information noise vs. regions & communities isolated from basic and beneficial information and divide between communities that are able to transform of information into knowledge vs. those that are not.

⁴ Although this notion of “literacy” rapidly becomes outdated, as unless the concepts of “literacy” in the age of digitalization and automation should be redefined and evolved to include the navigation and direction of complex flows of information, change, and collaboration.

⁵ <http://www.unesco.org/new/en/education/themes/education-building-blocks/literacy/resources/statistics>

⁶ <http://www.hays-index.com/wp-content/uploads/2016/09/Hays-GSI-Report-2016.pdf>

However, the real challenge is more fundamental: does institutional design of the educational sector correspond to the emerging global context and the next phase of civilizational development? Could education be one of the roots of the modern crisis, as it reproduces old and inefficient patterns of mass thinking and acting in our society⁷? Or, can it become part of the solution, a sphere wherein new practices and new values for a better and healthier world are cultivated and transferred?

Modern civilization faces a myriad of existential threats and direct repercussions of global societal dynamics including climate change, decreasing biospheric resources, various risks to global security and wellbeing, and increasing global inequality that are endogenous to the existing industrial society [Milbrath, 1989]. In the midst of this accumulating crisis, our governing structures and our dominating cultural patterns and thinking models all lack the ability to process and respond to the accelerated increase of social, technological, and environmental complexity. Mass-scale education of the industrial era should be directly held accountable for this situation: it does not prepare us for living in the complex world, it reduces our creative potential and our innate ability to collaborate with each other, it desensitizes us to become good workers but poor human beings, and it disconnects us from life and living processes.

In the current state of affairs, education is still largely preoccupied with maintaining things as they are, reproducing industrial society conventions. Although the so-called developed world in recent years has attempted to alter its ways by embracing knowledge based economy (whereby focus shifts from mass manufacturing of material goods to mass production of knowledge), it has so far been unable to resolve the 'ills' of industrial society, including the imbalance between society and nature. A redesign of our educational systems for the 21st century should inextricably address economic, ecological, and political injustices opening up the possibility of open access and redistribution of human wisdom, wealth, and well-being. In order to cope with future challenges, and to foster global well-being and flourishing, it is necessary to cultivate a wisdom-based society, where collective wisdom as "fundamental pragmatics of life" [Baltes, Staudinger, 2000] drives decision-making and development of human potential (Figure 1).

In response to growing necessity for the transformation of society, approaches to 'new' education arise within and outside traditional education systems. Three of the main factors enabling this process at global scale are:

1. Growing complexity of socio-technical systems (transport, energy, telecom, mass production etc.), the rise of VUCA (volatile, uncertain, complex & ambiguous) socio-economic, political, and cultural landscapes, and evolving demand for new skills and knowledge (see Section 1.3)

⁷ In words of Humberto Maturana and Francisco Varela (1987: 248), "at the core of all the troubles we face today is our very ignorance of knowing, ... the knowledge of knowledge".



Figure 1: Rise of Wisdom-Based Society

2. Increasing gap with the existing educational system due to insufficient capacity of existing educational institutions and national systems for adaptation, their continued investment in conventional industrial processes and models, and continued reproduction of outdated “ways of knowing” (epistemology) that do not prepare society to cope with 21st century challenges

3. Emerging technological innovations in ICT (mobile connectivity, automated data analytics, artificial intelligence etc.) and related fields (robotics, neuroscience, biopharma etc.) enable the creation of many novel ways of individual and collective learning and teaching⁸.

These pressures are creating the ideal conditions for the rise of “new” network-based education that is able to provide more relevant content and learning experiences by involving a variety of new providers, weaving learners and providers into a web of interconnected learning spaces and processes and creating flows of information that allow such systems to become increasingly flexible and adaptive – while at the same time becoming increasingly global.

The rise of new education as a global (and not local or national level) phenomenon is additionally amplified by the following factors:

- ◆ Increasing numbers of people around the planet recognizing that the main challenges of 21st century – environmental, economic and political – all exist on planetary scale, and that (despite opposing political divisions) the globalization of economic, political & cultural life continues, fostering a growing wisdom / knowledge commons of global content in media & daily life. Internet and new information technologies (e.g. automatic translators) further enhance the proliferation of global content and culture. It becomes widely understood that we need to master the

⁸ Our first Global Education Futures report [2014], available at www.edu2035.org, has considered this subject in detail

collective art of peaceful being on this planet through collaboration and cocreation, or, in the words of Stewart Brand [2009], the “Planet Craft”

- ◆ Around the world in education, a number of impactful players have been and continue to nurture global educational processes and standards – such as global online learning platforms (e.g. Open edX “ecosystem”), global social movements (such as “changemaker” social entrepreneurship practices spread by Ashoka Foundation and sustainability-driven curriculum spearheaded by a number of global environmental organizations) to global technological corporations (Google, Microsoft, and Intel, among others), and some of the world’s leading universities (such as MIT, UC Berkeley, Cambridge, National University of Singapore, and many others) that have been spreading their presence and influence across the globe.

These shifts at the supranational level are coupled with the rise of new global forces that massively transform leadership around the globe in a bottom-up way. The “blessed unrest” of social movements and NGOs [Hawken, 2007] empowered people of classes and generations to bring change into spheres most impacting their lives: education, healthcare, security, culture, and more – representing a third force that complements and counterbalances governments and the corporate sector. An increasing democratization of excellence, where even younger people exhibit masterful capacities while our elderly generate highly inspirational creative ideas, welcomes systemic innovators to disrupt existing systems even without approval from national political and business elites (whose interest often remains in preserving the state of affairs as the way to retain their position of power). The blessed unrest presents our collective ability to bring new education into being by mobilizing the grassroots action of learners and educators themselves.

And so, we are in the “perfect storm” that calls for the perfection of collective choices. In the past, our ancestors could rely on adaptation, competition, and self-organization forces that would shape our collective being – but the level of challenges faced by humanity today calls us to find answers through a consciously created consensus. We are living in the Age of Anthropocene, when the collective activity of our species has become a visible factor of Earth’s geology, including disruptions brought to climate and geochemical natural cycles⁹. We are facing Sixth Extinction – the fastest eradication of species ever in the history of biosphere, and it is man-made [Kolbert, 2014]. We create autonomous and self-aware machines that may quickly learn to outperform human beings in any intellectual or physical task – and we do not have clear strategies of coping with the challenges that this may bring. We

⁹ <https://www.thesolutionsjournal.com/article/how-defining-planetary-boundaries-can-transform-our-approach-to-growth/>

still toy with the idea of deploying weapons of mass destruction in a conflict between industrial nations that may lead to a devastating planetary war.

Now, a plethora of global challenges represents an opportunity for the renewal of ways we think, choose, act, and co-create – allowing for collaboration, creativity, and innovation that the human family has never yet seen at this scale. An unseen situation calls for unconventional answers, and it can serve as the catalyst to both inspiring and uniting the best of human endeavor toward a global expression of our collective potential. Education becomes both the answer to mounting challenges and a key leverage point for the rise of complex society and the fulfillment of every human being on the planet. If “evolution is how the universe learns, and learning is how humanity evolves” [Laszlo, 2017] then what is before us as a human community is the intentional evolution of our capacities to learn and lead in such a way as to co-create our healthy and desirable future together here on Earth and potentially beyond.

1.2 Megatrends Shaping Our Future

Nearly 50 years ago, a US sociologist Alvin Toffler indicated that continuous and accelerated change is the main trend of industrial civilization [Toffler, 1970]. Since the time of his observation, the trend continues both in technological and social domains. Effects of technological acceleration have been most visible in domains of so-called exponential technologies such as digital (especially Moore's law for computational power), biotech, and nanotech, also mutually reinforcing each other [Kurzweil, 2005]. Similarly, changes of social norms (e.g. women voting, interracial marriages, change of number of children in family, legalization of abortion and recreational drugs, etc.), while slower, also followed the trends of acceleration, at least during the last century¹⁰.

Accelerated change¹¹ has been an immanent quality of the industrial society, derived from its three key developments¹²:

- ◆ "Social machines"¹³ of knowledge creation & innovation – from research universities and corporate R&D and engineering departments to regional & national innovation ecosystems, – that establish a steady flow of new technologies
- ◆ INetwork technologies, from telegraph to television to web and social media, that become vehicles of rapid proliferation of new technologies and norms¹⁴
- ◆ Institutions of globalization that have gradually evolved from free trade agreements that supported flows of capital & exports towards global standardization of technologies, professional requirements, and educational process.

While industrialization and globalization are solving many of the world's problems, including remarkable reduction of famines and epidemics over the last century, they have also brought many new ills, including the destruction of natural environment, climate change, and destruction of indigenous communities and unique cultures all over the planet.

However, nations and regions that tried (for whatever reason) to evade industrialization, soon found themselves marginalized and overpowered by those who chose to follow the path of industrialization¹⁵. Later, in the second half of 20th century, those nations that sought economic prosperity by employing the innovative and creative potential of their population, creating innovative and knowledge-based economies, have consistently succeeded more than those that rely on control, oppression, and brute force. The indus-

¹⁰An evidence for the US is presented by Bloomberg at <https://www.bloomberg.com/graphics/2015-pace-of-social-change/>

¹¹As Francis Heylighen argues, the observed acceleration of socio-technical change may be seen an indicator of a more fundamental transition towards a new level of civilization, a meta-system transition towards Global Brain of the society: <http://pespmc1.vub.ac.be/Papers/AcceleratingEvolution.pdf>

¹²These are, as suggested by [Korotayev et. al., 2006], elements of a "positive feedback" mechanism that self-reinforces certain kinds of dynamics within a system

¹³Here, we follow the terminology of Lewis Mumford (1970) who understands social institutions of the industrial society (and pre-dating agricultural societies) as "mega-machines" built of human beings and material components.

¹⁴See works by W. Brian Arthur, e.g. <https://hbr.org/1996/07/increasing-returns-and-the-new-world-of-business>

¹⁵This was most evident from the history of 19th and early 20th century Asian nations, including Japan, China, and Korea.

trial socio-economic model remains strong, despite social discontents and environmental hazards it creates, and so it is most plausible that new ways of working, living and being will come about through evolution, rather than abandoning, of this model.

As one of key processes coupled with proliferation of industrial society, regions of the world become increasingly urbanized, and since early 2010s over half of global population resides in cities¹⁶. Global civilization continues to become more complex and more technologically and socially advanced, and there is very little doubt that it will continue to ascend on the pathway of accelerated change in coming decades.

The most powerful and immediate drivers of social & economic change around the globe, visible to, and supported by, nearly all global stakeholders (including governments of developed nations and emerging economies, global technological corporations, international social movements, globalized academia, etc.), in the next decade arguably are:

A. Digitalization: We are moving into a time of mass digitization in which humanity will be immersed in data¹⁷, locally and globally connected through mobile and smart/adaptive human-centered technological environments smart homes and cities¹⁷, drones, street robotics, “internet of things”, as well as wearables and implants. Furthermore, with increasingly intense use of artificial intelligence (programs and agents), and the rise of hybrid (augmented & virtual) reality, the evolution of what it means to be human in the technologically infused biosphere will shape the future to come.

B. Automation: We are now moving into an era that could be understood as the next industrial revolution¹⁹, driven by digital technologies, new materials, biotechnologies, and renewable energy, where widespread application of artificial intelligence, robotics, 3D printing, and other disruptive technologies [Manyika et al. 2013] will create tremendous impact on shifting the nature of learning and work. In the present model of industrial society, around a half of all jobs in the world that have “routine” components, both in manual labor and in intellectual labor (marketing, finance, communications etc.) can be replaced by the artificial intelligence and robotics, even with existing level of technologies [Frey, Osborne, 2013]. Furthermore, some technologies such as 3D printing and biotech can disrupt whole industries and supply chains, replacing conveyor-type mass-production economies with adaptive regenerative manufacturing networks. While similar dramatic shifts in occupation and organization have been known to our civilization in the past (e.g. when societies moved from agriculture towards industrial societies), they have never occurred at this pace, as displacement can happen in less than one generation. This transformation most likely will require creating new viable opportunities for participation, jobs, and ways of engaging in the human endeavor for

¹⁶ See <http://www.un.org/apps/news/story.asp?NewsID=48240#WMhWcm-GPIU>

¹⁷ “EMC and IDC have been tracking the size of the 'Digital Universe', or DU, since 2007 (the DU is all the digital data created, replicated and consumed in a single year). In 2012 EMC and IDC estimated that the DU would double every two years to reach 44 zettabytes (ZB) by 2020 (that's 44 trillion gigabytes). Astronomical numbers need astronomical illustrations, which may be why EMC/IDC pictured 44ZB as 6.6 stacks of 128GB iPad Air tablets reaching from Earth to the moon. The DU estimate for 2013 was 4.4ZB (or one stack of iPads reaching two-thirds of the way to the moon).” <http://www.zdnet.com/article/the-internet-of-things-and-big-data-unlocking-the-power/>

¹⁸ See Cisco report on data trends: <http://www.cisco.com/c/en/us/solutions/collateral/service-provider/visual-networking-index-vni/vni-hyperconnectivity-wp.html>

¹⁹ This phenomenon is discussed within different conflicting paradigms that claim it the third (Jeremy Rifkin), the fourth (Klaus Schwab, CEO Siemens), or even the sixth (Sergei Glaziev, based on studies of Kondratieff) wave of industrial revolution

a massive portion of the global population. With the rise of automation there will be a drastically increasing demand for creation of new sectors to which people will flow, and there are at least five sectors where significant creation of new human activities (whether they be called “jobs” or not²⁰) may occur:

- ◆ “New” technological sectors that will emerge with the development of next generation of technologies for industrial and consumer application (e.g. design & programming of smart energy grids and other smart ambiances for cities and households, or production of urban robotics and unmanned autonomous vehicles, or design and production of renewable bioengineered materials, etc.²¹);
- ◆ “Human-centered services” that focus on “what robots will not do”: as the two least imitable human qualities are creativity and “human touch”, there is a plethora of existing, possible, and even not yet anticipated highly personalized services that can be provided in education, wellness & healthcare, experience design, entertainment etc.;
- ◆ Virtual economies: economies created within virtual gaming worlds, social media and other types of virtual environments, where people can have indefinite occupations as designers of simulations or players within simulations²² – as virtuality allows to overcome any practically constraints that exist in the physical reality, and create worlds with any “designer rules”, even those that can be impossible or implausible within the “real” world;
- ◆ Knowledge creation sector: while it is unrealistic to anticipate qualitative shifts in the involvement of people in scientific knowledge creation (due to “natural” limitations of science as a phenomenon (Panov, 2011)), there is a significant and growing demand for localized and contextualized knowledge of communities and networks – such knowledge is indispensably connected to the governing of these communities, and is developed through facilitated collective intelligence and co-creation;
- ◆ Eco-regenerative economy that is not only focused on making processes and products sustainable (in accordance with UN Sustainable Development Goals and beyond), and creating respective “green jobs”, but the one that focuses on restoring the balance of humanity with the planet, in which humans increasingly play role as gardeners, foresters, and guardians that help protect and develop natural ecosystems of our planet.

Furthermore, we should look at these new sectors less as conventional industrial employers and more as the domain of occupation and self-reali-

²⁰ In the foreseeable future, the phenomenon of “work” may change to the extent that people spend less time in their “jobs” and more time with their “devotions”

²¹ One of the largest compendiums of “jobs of the future” has been compiled by our group in Atlas of Emerging Jobs, available at <http://www.atlas100.ru/en/>

²² Consider live streaming gamers or professional “gold farmers” as “early bird” job examples of this sector

In the past, education systems have held up the promise that “if you do well with us, you’ll get a job and you’ll manage to have a successful life.” The shift we are facing is where that promise can’t be held out anymore. We need to define “success” differently, and to prepare for the future where work will be very very differently distributed and also plays very different role in people’s lives.



VALERIE HANNON,
Director of Innovation Unit,
co-founder of GELP

zation. Wide proliferation of automated solutions such as robotics, Internet of Things and artificial intelligence, further development of 3D printing and other additive technologies, and wider use of bio-ecosystemic production of food, energy, and materials has a potential to gradually move our civilization towards the state of abundance [Diamandis, Kotler, 2012]. In the abundant society, work is no longer motivated by the need to provide for basic needs, and various social mechanisms such as lower weekly working hours or basic universal income can provide the majority of the population with spare time that they potentially can dedicate to creativity, exploration, learning, and enjoying life – with gradually increasing focus on integral long-term progress of individuals, communities, societies, and their relations with nature²³. In this situation, education can provide more than the skills necessary to become a socially accepted individual – it can help restore one’s meaning of life and empower one to take a path of passion and inspiration²⁴.

C. Transformation of social institutions: The dramatic emergence of technological innovations will have a widespread impact on our society, organizations, and communities, and at the same time these accelerating shifts are amplified by the dynamic fluidity of our social environments which are now deeply affected by social, ecological, and economic volatility, uncertainty, complexity, and ambiguity (VUCA). In the midst of increasing pressures societies’ conventions and systems that were designed for the past may not be fit for the future. With the removal of artificial boundaries in the world of work & governance we will see the rise of “ludic” communities that naturally blend working, living, and creativity in which people are empowered as entrepreneurs at the leading edge of societal evolution. Not only will these influence the function and form of our institutions as they evolve to meet the needs and prepare future generations for the future to come, it will also require systems of governance and finance that integrate collective intelligence and AI network-centered organizations that solve both local and global challenges. Furthermore, the birth of new financial systems such as crypto-currencies, “reputation currencies” and other blockchain powered systems of community resource governance [Tapscott & Tapscott, 2016], and changes in values and motivation “beyond money” may open the door for universal appreciation for human authenticity, wisdom, care, compassion, and love.

D. Demographic shifts. Although demographic transformation is a “slower” process when compared to fast changes in technologies and social norms, it is also one of the foundational for any society. The first and most important change is the increased longevity: it is anticipated that, with continuation of existing trends, around the middle of 21st century, the average life expectancy will get close to 100 years in the “developed world” (countries currently belonging to OECD group), and, accordingly, a consid-

²³ The conversion of a remarkable population share into a “leisure class” may represent a significant challenge for existing or emergent social elites that will aim to retain control over the society, likely be resolved by them creating many new, even artificial, occupations “keeping people busy”. Even though this scenario is highly plausible, it is essential that novel occupations recognize the greatness of human potential and unfolding individual, communal, and planetary developmental needs.

²⁴ As Buckminster Fuller wrote: “We should do away with the absolutely specious notion that everybody has to earn a living. It is a fact today that one in ten thousand of us can make a technological breakthrough capable of supporting all the rest. The youth of today are absolutely right in recognizing this nonsense of earning a living. We keep inventing jobs because of this false idea that everybody has to be employed at some kind of drudgery because, according to Malthusian Darwinian theory he must justify his right to exist. So we have inspectors of inspectors and people making instruments for inspectors to inspect inspectors. The true business of people should be to go back to school and think about whatever it was they were thinking about before somebody came along and told them they had to earn a living.” (from “The New York Magazine Environmental Teach-In”, panel by Elizabeth Barlow in New York Magazine (30 March 1970), p. 30)

erable number of people will live to 120 and beyond²⁵. Successes in medical advancement, include the creation of therapies for cancer and neurological disorders, will allow the majority of the population to live an active life at least until 90. Increased lifespan also leads to fewer births; this transition has already happened in developed economies, where one or two children per family is a norm, and it is currently happening in rapidly urbanizing Asian, African, and Latin American nations²⁶. The share of youth in the global population will continue to decline, and the share of people above 65 will continue to increase – and this process will dramatically rebalance the structure of educational needs, as well as create demand for new approaches towards a growing cohort of senior learners.

E. Transition towards sustainable societies. As the negative impacts of industrialization on the natural environment have become increasingly visible all over the planet, the “green” agenda began to inform the decision-making of corporate, public, and social leaders. Our society remains dependent on fossil fuels and other non-renewable resources, the manufacturing sector continues to pollute air, water, and soil, and practices of industrial agriculture and fishery continue to destroy biosphere towards a dangerous “point of no return”. But there is a growing recognition of the scale of problem, a growing demand for systemic response, and a growing wave of innovations that not only address many of the environmental problems, but also do it in an economically-efficient way. There is an increasing trend for introduction of sustainable practices in urban construction, industrial manufacturing, transportation, and more. “Green” agenda, especially the one that is oriented towards problem-solving, not problem-naming, will shape the demand for new skills and social practices in the decades to come – until it becomes a natural way of living in all societies on the planet.

While we live in complex and fragile times, local and global security and freedom depends on grassroots resilience and peacemaking that unifies with societal transformations that increase our human capacities to live and learn in a way that is congruent with our present context and shapes our future. All of these changes imply a shift in values and vision that will inspire a new era of collective potential on our biosphere and beyond.

All of these changes imply that we must adopt values and practices that are more congruent with our present and future contexts. In order to think and act differently, we have to develop new competencies that will allow us to lead healthier, happier, more productive and more fulfilling lives – and will enable more desirable futures.

²⁵ See forecasts at UN Population Division website: <https://esa.un.org/unpd/wpp/>

²⁶ See for detailed explanation of “demographic transition” phenomenon: <https://ourworldindata.org/world-population-growth/#demographic-transition>

We have to develop a generation that will take on the challenge of regenerating ecosystems to increase our health and restore our planetary systems.



DAVID MCCONVILLE,
Co-director, Buckminster
Fuller Institute

1.3 21st Century Competencies: Increasing Demand²⁷

The changing global landscape of work and lifestyle ushers in a mass demand for new individual and collective skills. Knowledge becomes contextualized and collectively constructed, therefore specific skills become less relevant than the meta-skills necessary to construct knowledge, including the diversity of thinking styles, collective intelligence, empathy, etc. “Soft skills”, such as collaboration, communication, or creative thinking, are increasingly needed for employability and successful career-building and vocational satisfaction as well as higher quality of life and deeper levels of citizenship participation and contribution. These shifts are amplified by accelerated structural changes of global markets and supply chains, massive job destruction and job creation driven by the influx of technological and social innovations, and proliferation of new global technological, financial and environmental standards. Professional and social life changes dramatically, with increasing numbers of people spending time in flatter, more globally distributed, and more diversified organizations and communities, performing highly creative and collaborative work in digitally enhanced environments, within working streams that are aligned with their personal and greater social purposes, and where lifelong learning is imminent²⁸.

The above-mentioned factors, coupled with the drive for increased competitive excellence in and between many regions and nations of the world, establish the demand for “future skills” – skills that will make people more strategically competent in anticipated socio-economic and technological contexts. An emergent consensual view²⁹ of these “future skills” includes:

- 1) Various “hard” skills & knowledge related to changes of technologies & working contexts and
- 2) “Soft skills” and general knowledge that can be applied across the range of professional, social, and personal contexts (including those related to the wave of technological transformation³⁰), such as:
 - ◆ Skills and knowledge that help to deal with *fundamental volatility, uncertainty & ambiguity of the future*, including collaboration, creativity, entrepreneurial skills, etc., as well as skills that generally increase personal resilience (e.g. health-inducing habits and ability to cope with stress) – but also future awareness (the ability to understand and or enact a variety of future scenarios and create relevant individual and collective action strategies);

Education needs career; careers and deep education go like hand in glove.



RALPH WOLFF,
Founder, Quality Assurance
Commons

²⁷ This chapter is developed in more detail in the upcoming Global Education Futures report “Future Skills for Complex World”, created in partnership with WorldSkills Russia.

²⁸ See “New ways of working” report by B-Team: <http://bteam.org/plan-b/new-ways-working-report/> and Future of Work community: <https://www.fowcommunity.com/>

- ◆ Skills and knowledge that help to deal with the *growing complexity* of our civilization, including systems thinking, problem-solving and opportunity-oriented thinking (as well as artistic, poetic, etc.) etc.
- ◆ Skills and knowledge that help to live in an *information & communication technology-rich world*, including basic programming skills, information searching, processing & analysis skills (e.g. knowledge mapping), information hygiene³¹/media literacies, etc. Among the most important skills that are necessary for the future information-intense world is attention management, the basic capacity to direct and focus attention (that can be trained through a multitude of contemplative practices).
- ◆ Skills and knowledge that will focus on “*what machines cannot do*”, including empathy/emotional (or interpersonal) intelligence, bodily intelligence³², and naturalistic intelligence, as well as fostering the capacity of co-creating with, and authentically serving others
- ◆ Skills and knowledge dedicated to embracing *purposeful multidisciplinary*, becoming proficient in multiple areas of work & life.

Additionally, our ability to succeed in anticipated future contexts is dependent upon fundamental aspects of human personality that determine the way one lives and acts, often labelled as “character”³³. Features are commonly believed to be inborn or formed at an early age; however, advancements in psychotherapy and human potential practices indicate that even some fundamental features (e.g. optimism [Seligman, 1991] or “growth mindset” [Dweck, 2006]) can be learned, re-learned, or transformed at any age. We, therefore, label them as “existential skills”. These existential skills include an ability to set and achieve goals (willpower), self-awareness / self-reflection ability (mindfulness), an ability to learn / unlearn / relearn (self-development) relevant skills (e.g. skill-formation ability), and more.

Arguably, the classification of “soft skills” also needs to be made in a more precise way – as some of them (e.g. collaboration skills) are more complex skills that are established upon more fundamental and more universal skills (such as communication skills, or emotional intelligence). We suggest using a four-layered competency model:

(1) Context-specific skills (including, but not limited to, “hard” skills) are skills that are developed and applied in specific context, often using specific tools, e.g. surgery skills, bicycle riding, video blogging, or tango dancing;

We already live in an omnipresent media sphere that is designed to attract, and maintain, and distract attention for profit. We are untrained to control our attention. So we need to begin paying attention to our attention.



HOWARD RHEINGOLD,
Founder of Rheingold University

Existential competences have to do with aspects of being and aspects of development. They are different dimensions of self-knowledge: knowledge of me now, the ability to be present, the ability to know what I feel right now, the ability to perceive what is perceivable. That should be one of the dimensions of everybody's development from childhood.



CLAUDIO NARANJO,
Psychiatrist, founder of SAT
Institute

(2) Cross-contextual skills are those that can be applied in larger domain of social or personal activities, e.g. an ability to read & write, or time-management skills, or teamwork skills, etc.;

(3) Meta-skills are primarily different modes of operating objects in our mind or in the physical world, very close to what Gardner (1983) has called “multiple intelligences” or “intelligence modalities”, ranging from logical-mathematical to bodily-kinesthetic and interpersonal;

(4) Finally, at the most foundational level there are “existential” skills that can be universally applied throughout lifetime and different living contexts on an individual.

These various layers of competencies also have various life cycles (see Figure 2): in particular, context-specific skills (including “hard” skills in a professional context) can be learned and re-learned within short training cycles and can quickly become outdated because of the changes in context – i.e. skills necessary to work in a word-processing software or to operate a tooling machine can become redundant due to changes in technology. Cross-contextual skills have longer life cycles (years or even decades), and also require longer periods to learn. Meta-skills, and in particular existential skills, have the longest life cycle; they are usually developed in the earlier stages of human life and rarely change afterwards. However, those individuals who are able to re-develop their “existential skills” on purpose are also able to change a variety of their lives’ aspects – it is why psychotherapy and spiritual practices often have transformative influence on individuals even at a senior age.

“Future skills” (or 21st century skills, as they are becoming increasingly relevant for the century we are living into) address demands of the transforming economies and societies. It is through “future skills” that we become more complex persons and communities who respond to the need of emerging complex societies. Furthermore, the transformation of society and economy would go faster and would become more robust should these skills of the future be acquired by population en masse. However, to date there is a gap between current conventional educational systems, curriculum and learning processes and the need for “future skills”.

We have a quest for meaning, it's something that human beings need. Education should go back and to pay attention to that part of the human condition.



DENNIS SHIRLEY,
Professor of Education,
Lynch School of Education at
Boston College

The key future human competency is permanent “self-production”, an ability to preserve oneself in a constantly changing environment.



ALEXANDER ASMOLOV,
CEO, Russian Federal Institute of Education Development

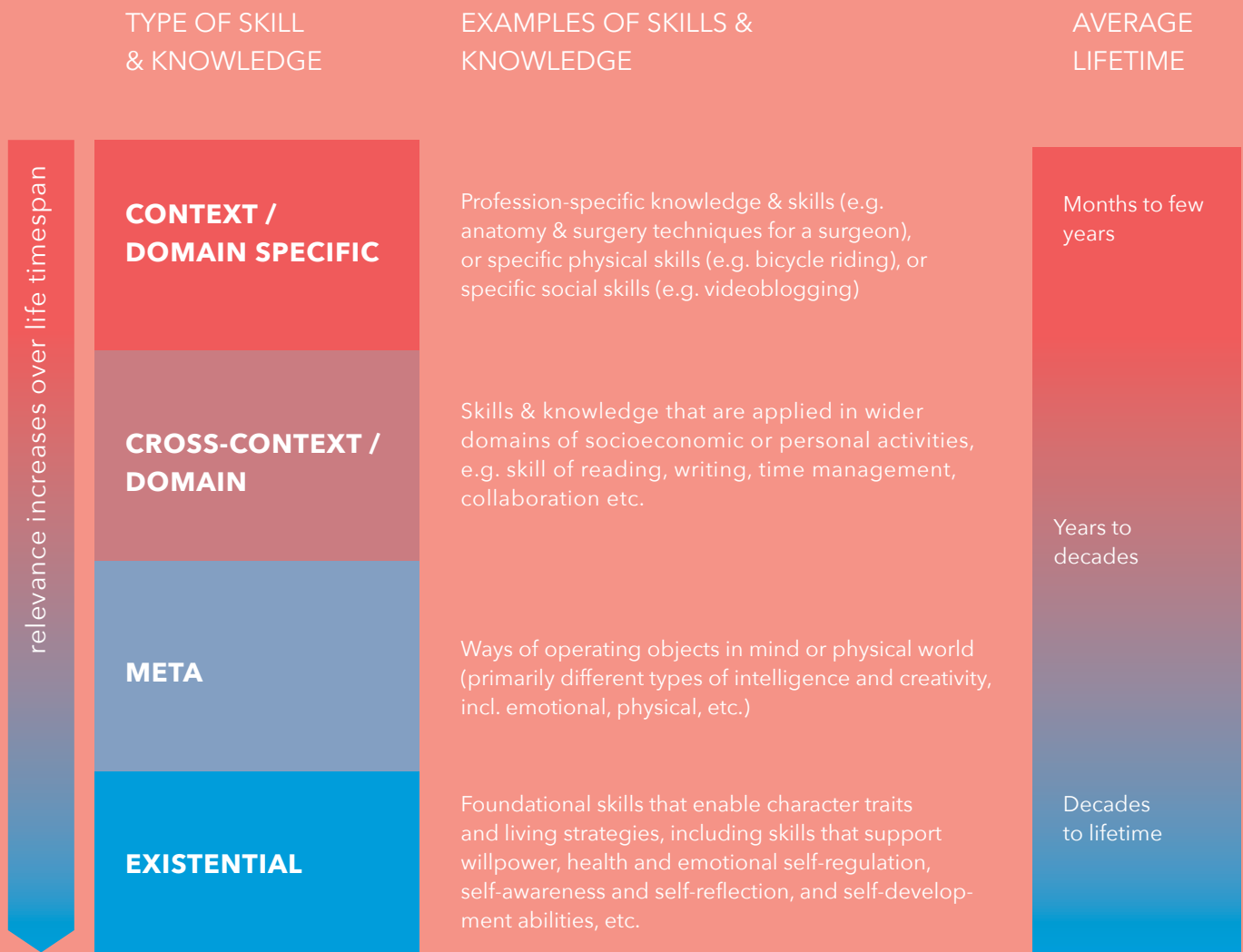


Figure 2: Lifecycle of types of skills & knowledge

1.4 Educational Factory Systems Failure

The industrial model of “assembly line” education is based upon the premise of preparing a mass scale workforce to fulfill factory fit skill sets and industrial leadership types. Given the transforming economic and social environments of the 21st century “industrial” approaches to education are increasingly incongruent with our current and future context. This mismatch leads many stakeholders within and outside of the education system toward the belief that “educational systems are broken”. Yet the degree to which our educational systems are degrading our collective potential is often underestimated. Whenever critiques of our present processes surface, the focus is primarily on various failures to deliver on competency and capacity building for current demands such as better managerial, engineering, or programming skills. However, the future demands are fast arriving, shaped by the megatrends we have listed above in Section 1.2. The growing gap between our current models and our future societal needs establishes the need for a paradigm shift in our educational systems.

We must remind ourselves time and time again that educational systems are “reflective” in nature³⁵. Every element of our educational models, from curriculum to teacher’s behavior to learning environment organization to school administration principles, conveys a message to learners and become their circumstances for learning. We cannot anticipate learners to prepare for the world of tomorrow if our learning environments and processes remain unchanged, and if they reflect values and societal organization of the past (see Table 1). In particular:

- ◆ We cannot teach people to be creative by giving them standard tasks as the basis of their learning process³⁶
- ◆ We cannot teach people to be collaborative and work with each other by addressing them individually or by putting them in competition against each other
- ◆ We cannot teach people to be empathic and emotionally intelligent by removing emotion and focusing primarily on cognitive abilities
- ◆ We cannot teach people to be lifelong learners able to set and achieve their learning goals if we deprive them of self-exploration, degrade their courage to learn by not allowing learners to shape their own curriculum, to follow their passions or to remove themselves from areas they are not interested to explore, or if we punish for perceived “failure”
- ◆ We cannot teach people to develop media literacies or information hygiene if we remove information technologies from the school, including prohibition of students’ personal devices;

²⁹ See: World Economic Forum analysis: http://www3.weforum.org/docs/WEF_Future_of_Jobs.pdf
OECD analysis: <http://www.oecd.org/employment/future-of-work.htm>, UK CES analysis https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/303334/er84-the-future-of-work-evidence-report.pdf, the work of Henry Etzkowitz on Novum Trivium <http://journals.sagepub.com/doi/abs/10.1177/0539018412437099> etc.

³⁰ See e.g. <https://www.weforum.org/agenda/2016/01/the-10-skills-you-need-to-thrive-in-the-fourth-industrial-revolution/>

³¹ We argue that critical thinking, while useful, should not be seen among the key “skills of the future”, as it often impedes creativity & collaboration, and needs to be replaced with opportunity-based thinking. However, a limited use of critical thinking – “healthy doubting” and fact-checking, especially when interacting with social media & mass media – is a part of “information hygiene” that should be developed with citizens of 21st century.

³² In accordance with “multiple intelligences” framework developed by Howard Gardner [1983]

- ◆ We cannot teach people to live in a balanced way with biosphere if we deprive them from contacts with nature or constantly refer to nature as a “resource”;
- ◆ We cannot teach people to be mindful if we as teachers are not mindful; etc.

If we consider whether goals of education – formation of certain skills and knowledge – match means of education (processes, methodologies, skills and attitudes of teachers), it becomes evident that educational models are flawed in their very design. They prepare people for the circumstances of the past – for social obedience, for low-creativity jobs, for standard working processes, for competitive working environments – rather than for tasks of the future. What is the necessary scale of change of educational systems that will meet challenges of the future?

Although society and the economy will not change overnight, it may be anticipated that gradual adaptation of the existing system will help it to keep pace with emerging needs of new and transforming sectors. In fact, there are a lack of proper estimates of the global skills gap that take into consideration all of the anticipated shifts, so we can only point to indicators of the emerging future, such as:

- ◆ **Sectoral changes driven by new technologies:** The renowned study by Frey & Osborne (2013) estimated that by 2030 over 50% existing jobs worldwide (i.e. over 2 billion jobs) would technically become obsolete. Other studies such as the one recently published by OECD [Arntz, Gregory, Zierahn, 2016] provide notably more conservative estimates, but even they speak about considerable impact-at least 20 to 30% of existing workforces are being significantly altered or rendered obsolete by existing technologies. Of course, national governments can moderate and slow down the introduction of new technologies (thereby mediating their impact), but it is a sad choice between short-term social security and longer-term economic sustainability that will not allow them to postpone changes indefinitely. International economic competition, accomplished through increasingly intensive technological innovation and renovation, is often compared to the Red Queen Race from Lewis Carroll's *Through the Looking-Glass*: “It takes all the running you can do, to keep in the same place, and if you want to get somewhere else, you must run at least twice as fast as that!” Major nations of the world, from the United States and Germany to China, India, and Russia, consider technological renovation with next-generation technologies as one of their priorities. Yet even with the previous wave of technological renovation, the “digital transformation”, a recent global study by CapGemini

The biggest shift we would like to see in education is the shift from teaching a subject to developing a person.



GARRY JACOBS,
CEO, World Academy of Art
and Science, and CEO, World
University Consortium

³³ See the framework suggested by the Center for Curriculum Redesign [Fadel et al., 2015]. <http://curriculumredesign.org/our-work/four-dimensional-21st-century-education-learning-competencies-future-2030>

found that nearly 90% of companies consider that their employees has insufficient skills for the coming digital world³⁷. This way or the other, introduction of new teaching methods and new curriculum for the next wave of industrial revolution should involve at least 20 to 50 per cent of learners in developed economies already within the next decade.

- ◆ **Growth of flexible workforce:** As job markets rapidly advance toward more flexible and adaptive employment models more workers will be responsible for their own employment and skills development. According to Intuit study³⁸ by 2020 over 40% of US workforce will become a “contingent workforce” or freelancers. Since the US is in many regards a “trend setter” for developed and emerging economies (also through employment schemes used by global companies with American headquarters), we can anticipate a similar employment structure to spread around the world in next 10-15 years. This means that skills related to working and living in a “VUCA” world should be developed within the next decade for at least a half of the working population of developed and emerging economies.
- ◆ **Rise of purpose-driven empowering organizations and communities:** In the global competition for best talent (and especially from younger generations such as Millennials and Generation Z), organizations begin to abandon tighter and more limiting workplace protocols in favor of those that empower workers, give them more opportunities to do meaningful action that is aligned with their personal values, and also create circumstances to do “greater social good” through corporate action. In this way, corporations and businesses increasingly see themselves as vehicles of social change, on par with non-profit organizations and social enterprises. The changing working environment may be welcoming to the next generation of workers, but it may often be challenging to the existing workforce, which sets up growing demand for retraining and adult education.
- ◆ **Active seniors:** Demographic transitions are engaging over a half of population of our planet, and will lead to the increased longevity and a larger amount of senior people all over the world, especially in developed countries³⁹. Before the end of this decade, for the first time in human history, the amount of people above 65 will surpass the amount of people below 5⁴⁰. However, presently, educational institutions for seniors are scarce and fragmented, while the cohort of senior learners continues to grow at a steady pace. Many senior learners will seek opportunities for the development of “existential” skills focused toward meaning, joy, and contribution.

³⁴ The term “industrial education model” is based on the work of Ken Robinson who describes it as a “manufacturing model based on linearity [of the education process] and conformity [of educational content] and batching people [into groups] for study, based primarily on their age”. For details, see https://www.ted.com/talks/ken_robinson_changing_education_paradigms

³⁵ And so they adhere to Marshall McLuhan’s principle that “medium is a message” – probably more than any other domain in our societies.

³⁶ An inspiring short animation shows this gap in direct and inspiring way: <https://www.youtube.com/watch?v=kQjtK-32mGJQ>

³⁷ https://www.capgemini.com/resource-file-access/resource/pdf/the_digital_talent_gap27-09_0.pdf

³⁸ http://http-download.intuit.com/http.intuit/CMO/intuit/futureofsmallbusiness/intuit_2020_report.pdf

³⁹ One of the anticipated consequences is the collapse of Bismarkian pension system in many European economies. See e.g. <http://theconversation.com/the-pension-problem-at-the-heart-of-germanys-envied-economy-54360>

⁴⁰ http://cdn.censusnews.com/attachments/census_bureau-an_aging_world-2015.pdf

These indicators allude to at least three conclusions.

First, developed and emerging economies of the world will have to *transform their teaching methodologies and curriculum for a new generation of learners*, those who will become socially active in next 10-15 years (i.e. students of primary and secondary schools). As a critical mass of learners with new skills and attitudes needs to be induced, *at least* a third to a half of educational system capacities should be involved in these transformations.

Second, education systems will need to *address the demands of adult and senior learners* and therefore must be rebuilt and upgraded, as these cohorts will gradually become the main users of new educational opportunities.

Third, in addition to the above-mentioned technology- and economy-driven transformations, there are also socially-driven transformations that will have increasing impact on our society, such as the increased recognition of innovativeness and creativity as main drivers of social prosperity and flourishing, and the massive need for the capacity of change-making, social leadership, entrepreneurship, and creative disruption attained through *empowerment of citizens*, especially younger generations.

We must therefore seek new ways of learning and new organization of education that will bridge us with, and will bring us into, the emergent social reality. Yet, this is a challenging task: education is frequently claimed to be among the most conservative social institutions, and it is very expensive (and risky) to transform it as a whole. It is necessary to find “acupuncture points” of the system, the areas where even the minimal effort may yield the maximal result. Section 2 explores four areas of innovation that are critical for the transition towards educational systems of tomorrow.

Table 1: *Demanded competencies of the future and conflicting educational practices of the present*

KEY COMPETENCIES OF THE FUTURE	CONTEXTUAL DRIVERS OF EMERGING COMPETENCIES	EXISTING EDUCATIONAL PRACTICES WHICH LIMIT NEEDED COMPETENCIES	NORMS & COMPETENCES SUPPORTED BY CONFLICTING EDUCATIONAL PRACTICES
SOCIAL / EMOTIONAL INTELLIGENCE	Increasing need for cooperation, transition towards human-centered economy	Educational processes that primarily develop cognitive skills/abilities while decreasing emotional health between teachers, students, families, and communities.	The range of 19th century "literacies" (reading, writing, arithmetic) and scientific worldview. Need to control dynamics that may arise as a result of inter-generational communication
MEDIA LITERACY'S: INFORMATION HYGIENE, MEDIA ANALYSIS, AND MEDIA CREATION...	Increasingly complex (and often "toxic") information/media environments, accelerating amount of information flows, and increasing societal pressures and global challenges.	Prohibition of new information technologies/devices and holistic application of such tools in schools	Need to control school dynamics that may alter communication between students, flow of the lesson, etc.
MINDFULNESS PRACTICES: FOCUS, MEDITATION, RELAXATION, INTENTION		Lack of practices that develop attentiveness and mindfulness in teachers and students	Reproduction of concepts of 19th century "attention management" concepts (control through coercion of students) and prejudices
ECOLOGICAL INTELLIGENCE	Multi-faceted local and global environmental crisis and need for truly sustainable civilization	Limited contact with biosphere (access to animals and plants in school). Industrial era teaching methods, language, and metaphors.	Need to control school dynamics. Reproduction of 19th century concepts and prejudices regarding the phenomena of nature and life
CREATIVITY AND OPPORTUNITY BASED THINKING	High complexity, uncertainty & volatility of the environment (VUCA)	Standardized experiences, tasks, tests, and time conventions in schools	Obedience, compliance with standards, limitation of creativity
COLLABORATION AND PARTICIPATORY PROBLEM SOLVING		Individual completion of activities (tasks and tests) and prohibition of support between students; focus on competition-based education (winners/losers).	Pursuit of personal development and success (even at expense of others), encouraging students to meet expectations of authority.
METACOGNITION / LEARNING TO LEARN		Limitation or prohibition of: learning goal-setting by students, pursuit of personal interests in learning, independent study, research, and experimentation.	Obedience, compliance with standards, need to control school dynamics

2

TRANSITIONING TOWARD LEARNER- CENTERED EDUCATION

The current search for new educational funnels must be reversed into the search for their institutional inverse: educational webs which heighten the opportunity for each one to transform each moment of his living into one of learning, sharing, and caring.

IVAN ILLICH

2.1 Educational Technologies: A Failing Promise?

The aim of evolving educational systems to meet the challenges of the future is an ongoing and essential conversation. Discussions regarding the transition of OECD educational systems towards lifelong competence-based learning models began in the early 1990s, and since the early 2000s, with rapid proliferation of Internet and digital technologies, there has been hope that these emerging technologies, including big data & artificial intelligence, virtual and augmented reality, social networks, blockchain, wearable devices and neural interfaces etc., would support the improvement of educational process and bring them to a new level.

In fact, the first Agenda Reports of Global Education Futures⁴¹ published in 2014 was informed by the optimistic view that a revolution in education was unavoidable and immediate – as ICT “giants”, ambitious startups and venture capitalists, would turn their attention toward the education sphere and provide new technological solutions for it. Apparently, some of the “giants”, such as Intel, Apple, and Microsoft, were motivated by similar concepts, creating international programs that promoted computer literacy among teachers and students. Massive open online course platforms (MOOCs) that emerged in early 2010s have instigated a new wave of optimism with the promise to deliver a new paradigm of online-based education. However, three years later, in 2017, we can admit that the revolution is not happening just by old systems embracing new technologies, and that the observed speed of the transformation does not address the scale and scope that is needed to address emerging future challenges and opportunities⁴².

In this light it is necessary to understand why technologies have yet been unable to shift the dominating paradigm of education. Many emerging economies have hoped to leapfrog towards 21st century educational models without heavy investment into industrial type educational institutions. They rightfully expected that new technologies, such as online learning platforms, virtual reality simulators, and mobile applications, would dramatically cut down costs of creating primary, secondary and tertiary education systems (e.g. to reduce resources needed for preparation of new teachers and learning materials). Countries such as China and India are betting on Ed Tech as a “Holy Grail” which would resolve the existing deficiencies of industrial education systems – equally nations of Africa and Latin America are also seeking to adopt relevant solutions.

⁴¹ See http://www.edu2035.org/pdf/GEF.Agenda_eng_full.pdf

⁴² See e.g. <https://www.timeshighereducation.com/features/massive-open-online-courses-moocs-can-transform-education-but-not-yet>

That said, the majority of education technology innovations offer very narrow modifications within existing educational processes and programs. Or, they offered some dramatic departures from the existing educational process but failed to contextualize it with the variety of learner types – assuming that learners would just “naturally” pick up and use new technologies that will help them learn better by themselves – and most people may even not be able to do that⁴³. Therefore, most of these educational technologies remain existing within conventional educational systems – the system of classes and lessons, the hierarchy of teacher and student relationships, the system of assessments and qualifications. And so foundational principles of the existing system remain untouched and unchallenged by these technological innovations. Primary reasons behind the low impact of educational technologies to shift the dominant educational paradigm include:

- 1)** A lack of any substantial alterations of the teaching process⁴⁴ and student-teacher relations, and (perhaps, consequently) a low number of self guided learners in the system (see Section 2.2)
- 2)** A lack of integrated platforms that will “assemble” a variety of educational modules and solutions into personal “learning journeys” or “learning trajectories”, that will provide programs comparable/competitive with existing educational institutions (see Section 3.4 and 3.5)
- 3)** A lack (or insufficiency) of relevant policy changes and trust from job markets, parents, and civil society, that could make “new” education more widely demanded
- 4)** A lack of “self-guided” perspective within the educator community and educational institutions themselves: in a VUCA world it is essential to have clarity of intentions, while trying to react without a direction to ever-changing demands from educational consumers (parents, students and employers) may often lead to hectic upgrades and chaotic improvements.

Therefore, the revolutionary potential of new educational technologies is low not because of the quality of these technologies, but because of the context of their application that is set up by (a) skills and practices of teachers and students, and (b) “soft” infrastructure (platforms, institutions, social norms etc.) that will enable wider use of “new” education. Or, as suggested already a decade ago, learning systems of the future are socio-technical environments that “require a co-design of social and technical systems, and use models and concepts that focus not only on the artifact but exploit the social context in which the systems will be used”

⁴³ See e.g. http://www.slate.com/articles/technology/future_tense/2014/07/ed_tech_promoters_need_to_realize_we_re_not_all_autodidacts.html

⁴⁴ See as an example: <http://www.edweek.org/ew/articles/2015/06/11/why-ed-tech-is-not-transforming-how.html>

“The music is not in the piano”, but because of the piano we can wind up with great music that wouldn’t have happened otherwise. The great music happened in the minds of artists who contemplated some of the musical possibilities of the new instruments.



ALAN KAY,

US computer scientist, President of Viewpoints Research Institute

(Fischer & Sugimoto, 2006). This view was once again confirmed through multiple attempts to introduce disruptive technological innovations into the learning process that, without corresponding social redesign, usually failed. While technologies play a primary transformative role in education, hard or high technology with the poor application of “soft” or social technology is an under-delivering investment. The introduction of new technologies into education, though necessary, will not alone transform education.

The Ed Tech hype does not stand to its promise because the “human side” has yet to be redesigned. Without the “human side” Ed Tech innovations have been found lacking if not incapable of meeting the needs of learners and inadequate in radically changing educational systems thus far. Thus, teachers and schools find new technologies redundant, and few significant shifts in the organization or functioning of the classroom or learning process occurs. Future education technology design must include a focus on human qualities and design of use cases for real world application.

2.2 Four Radical Changes In Educational Systems

In order to create circumstances for “new” education, radical technological innovations need to be coupled with radical transformation of personal, relational, and systemic aspects of educational systems.

A. Rise of Learner-Centered Education & Raising Self-Guided Learners

Our research and vision building sessions have highlighted the transition towards lifelong learning as one of the major shifts in education of our time. From this emerging future, we redefine the concept of education as the *institutionalized process of learning and development support throughout the human life cycle from or before birth and until death*. Formal educational institutions are but a small part of the phenomenon of education, which also include the variety of other forms upbringing, learning, and self-learning at all stages of life, ranging from kindergartens and children playgrounds to professional communities to fitness clubs and therapy groups – various spaces where individual and collective learning occurs. We also suggest that in this emerging future education becomes spread across the lifetime of a person, instead of focusing on earlier stages of human life (Figure 3).

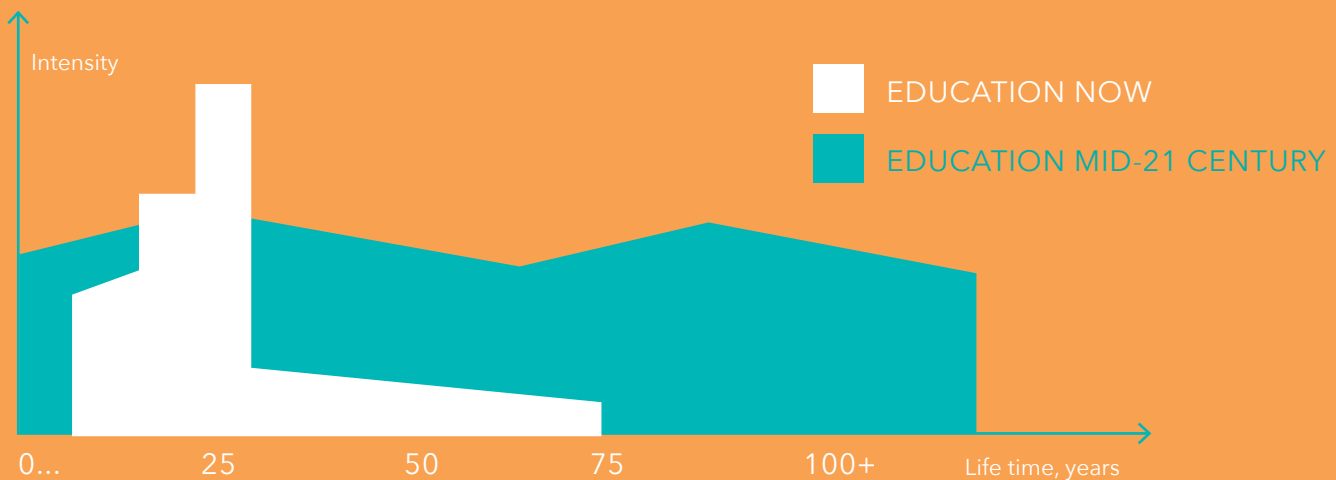


Figure 3: Transition towards lifelong education

Presently, the process of education can metaphorically be framed as a “rocket” model: the educational system creates a “launch pad” for an individual throughout school and university years, and “shoots” an individual into professional life, after which individuals “land” into retirement a few decades later. With the increased longevity, higher levels of unpredictability of the future, and longer learning cycles, this model becomes obsolete. It is not possible to prepare learners once for their entire lives – we will need to unlearn and relearn throughout our lifetimes in order to respond to the nature of our dynamic contexts. Education therefore becomes an organic element of one’s life, integrated into experiences of work, play, creativity, family, love, and throughout the entire human endeavor.

In an increasingly “VUCA” world, our responsibility for learning cannot be externalized solely to institutions and cannot be enforced by systems of encouragement or punishment. Presently, schools and universities often execute disciplinary roles, forcing people to learn and develop themselves. However, as the world becomes more complex and less predictable, the only way to foster the long-term resilience of our societies is to shift this responsibility to people themselves⁴⁵. Furthermore, all major educational innovations discussed throughout the last 20 years, such as individual learning trajectories and personalized educational technologies, or massive online learning platforms and various peer-to-peer learning formats as approaches to systemic educational innovation require a radical re-orientation of learners to evolve from passive consumers to active self-guided learners.

A self-guided learner⁴⁶ is one able to set goals, define pace and needs, attract and create necessary learning resources, and immerse oneself into a variety of learning experiences⁴⁷ that holistically develop integral capacities and aspects of one’s personality across the learning lifecycle. Furthermore, it is the cohort of self-guided learners that sets up the demand for new technology-enriched, personalized educational formats including online courses, educational apps, experiential learning, and more⁴⁸.

It is the cultivation of self-guided learning abilities that will contribute to the long-term resilience of our civilization. As noted above, the dynamic challenges of our time in history requires learners and leaders to develop fluency in navigating change and also directing the course of change in our communities, organizations, and society. Therefore, central to the transformation of our educational systems is this transformation of both learning processes and learning goals such that they unify learner-centered education with self-guided learner empowerment.

In the face of rising demand for more active learning processes and the

If we talk about self-guided learning, we need to ask ourselves: what is “self”? What is the impulse that is guiding?



ANNELOES SMITSMAN,
Founder of EARTHwise
Center

The student becomes a protagonist in her education in a general and flexible framework which adapts to her circumstances. And the teacher as such disappears and becomes a person who “empowers”



NOEMI PAYMAL,
Founder of emAne and Pedagoogia 3000 innovator networks

⁴⁵ For more detailed argument, consider “Antifragility” concept by Nassim Taleb (2012)

⁴⁶ Other terms used to mark this phenomenon: self-directed learner, self-taught or self-empowered learner, autonomous learner, autodidact, and more. See [Hiemstra, 1994] for details.

development of self-guided learners, there are many conventions and norms across the spectrum of society from government and business to family values and the social status quo that often maintain externally guided educational practices and foster passive learning. The current number of adult individuals with fully developed self-guided learning capacity is unknown, and the estimates vary greatly. Candy (1991, p. 145) argues that between 80% and 100% of adults engage in some form of sustained self-directed learning, while other experts suggest that fully developed self-directed learning capacity is rare and is only suitable for a small amount of the human population⁴⁹.

We believe that the growth of “determined” self-guided learners to a “critical mass” (around 10% of population, according to recent studies⁵⁰) is a key leverage point to the proliferation of “new” education, and that an “educational revolution” will only start in regions where such critical masses of self-guided learners exist. Therefore, we suggest that the next decade of learning innovations include a focus on “transitory” pedagogy and andragogy that can significantly increase cohorts of self-guided learners – in tandem with the emergence of “new” educational practices. Existing (and newly created) educational institutions interested in contributing to, and willing to become part of the “new” educational landscape, need to amplify learning processes and opportunities for self-guided learning skills to be formed including personal goal-setting, choice of learning methods, and purposeful co-creation of individual and collective learning experiences.

Among various practices that foster the emergence of self-guided learners, the most widely used are problem-based learning (see [Freire, 1970] for early discussions), project-based learning⁵¹, empowered learning and entrepreneurship-driven curriculum (which could be seen as “subtypes” of these methods) – and multiple evidences confirm the efficiency of problem and project-based learning in improving self-directedness of learning in students⁵². Also, learning methods that emphasize students’ creativity⁵³ and do-it-yourself capability⁵⁴ are also efficient. Finally, another, and probably most integral and encompassing, method, is play-based learning (especially live action role playing games⁵⁵), that involve holistic learning (development of emotional intelligence and social skills, and sometimes physical skills, alongside with cognitive ones), problem solving, long-term oriented (“project-like”) behavior for the development of “character”, and artistic expression⁵⁶. Of course, development of such pedagogies should come hand in hand with development of complementary

Any human is a natural learner. You can educate in a way that people retain their ability to learn from whatever they have to learn.



JERRY MINTZ,
Founder of Alternative Education Resource Organization

You could imagine, for example, somebody who is a gang-member committing to always learning and getting better and better as an audacious assassin. Self-guided learning is value-neutral – and this is where empathy and compassion become a natural extension, central to the self-guided learners. It’s empathic self-guided learning.



ROSS HALL,
Director of Education, Ashoka Foundation

EDUCATIONAL PROJECTS WORKING WITH SELF-GUIDED LEARNING

In the **Democratic School of Hadera** (Israel), children take control over their curriculum. This model has become highly successful and was converted into a International Democratic Education movement over last 25 years. **Summerhill School** in Suffolk, UK, founded by Alexander Neill in 1921 and still operating, is one of the earliest examples of a school made to fit the learner, and where learners co-run the school as a democratic community. Another example of early application of this principle is made in **Reggio Emilia** network of schools that advocate that the main purpose of early education is the self-discovery of ways to express oneself. A unique format of school as a learning ecosystem for self-guided learners is offered by **"Park-schooling"**, created by Miroslaw Balaban and Olga Leontieva in schools of Russia and Ukraine. The leading Latin American networks of schools that follow the self-guidance learning approach are **ReEvo** and **emAne**, and one of the largest "network of networks" that connects these and other networks globally is US-based **Alternative Education Resource Organiza-**

tion. Project-based learning methodologies are promoted by many groups including **ASCD** and **Edutopia**, while play-based learning is promoted by **LEGO** as well as many live-action role-playing groups such as **Game Academy**.

In higher and adult education, this approach is manifested by educational projects based on self-guided discovery and project-driven learning. One of the examples is **Kaos Pilots**, a Copenhagen-based highly innovative blend of a design school and a business school, where learners seek to solve world problems through entrepreneurial and consulting projects they make and learn methodologies and frameworks as they go about with their projects. In the education of scientists, a very successful model is developed by Parisian **Interdisciplinary Research Center**, where junior researchers accomplish self-guided dives into modern biology through learning-by-doing, accompanied by Socratic-type questioning posed by their supervisors.

skills (that help students learn better through projects and creative tasks), and – not to be omitted! – change in the relationship between students and their counterparts (teachers, administration etc.)

Ultimately, "transitory" educational innovations that serve the development of self-guided learners, would include:

- ◆ Fostering methods that put **learners in the "driver seat"**, allowing one to take control over goals and processes of learning, in particular, the ones that allow one to choose goals and attract learning resources as necessary (e.g. project-based or entrepreneurship-driven learning), the ones that allow learners to experience the multitude of roles and social situations in a safe and attractive learning environment (e.g. play-based learning), and ones that foster creativity and independent thinking and acting (e.g. problem-oriented learning, do-it-yourself, and learning with artistic components)
- ◆ Teaching students a variety of **tools and techniques that improve** their self-guided learning **ability**, from creating their personal learning plans to improving their skills of reading, memorizing, thinking, arguing, living through and reflecting upon experiences, etc.

⁴⁷ Including various experiments with not fully predictable outcomes

⁴⁸ <https://www.psychologytoday.com/articles/201607/the-golden-age-teaching-yourself-anything>

⁴⁹ Valerie Hannon argues in her book "Thrive" (2017) that we need to focus on a concept of "student agency" which is an intermediary station between the current situation of highly passivized student cohorts and future fully developed self-guided learners. "Student agency" is defined as being "purposeful, responsible, reflective, and investing in action" – emphasizing the importance of action and retaining a higher role of teacher in the process.

- ◆ Redefining the **role of a teacher** to serve as a guide and a role model of an inquisitive self-guided learner. A teacher should become a person who, instead of providing a one-way knowledge transfer to students, supports healthy learning environment, shares obtained knowledge and experience and learning from and together with students in collective exploratory journeys. This does not mean that the more traditional teacher role as an instructor will disappear completely – but it will be significantly reduced in favor of roles that emphasize facilitation and coaching
- ◆ Rebalancing **power structures** within schools and universities, allowing students to play increasingly responsible roles in regard to their curriculum, teaching methods, and learning environments – manifesting learner’s voice in the classroom, affecting not only what they learn, but how the process is organized and where it leads.

The rise of lifelong self-guided learning will assume that different aspects of the whole human being, and not only professional capabilities (or other capabilities related to one’s social role) need to be developed, supported, and nurtured. The real lifelong learning will deal not only with learning challenges and demands that one may have at a certain life period – but with thresholds and transitions between these periods. In ancient cultures, such transitions were marked with initiatory ceremonies that marked a passage from adolescence into adulthood, from maidenhood into maternity, from maturity into seniority, and more. We are longing for these “rites of passage” in our culture, and the new culture of learning will need to attend to the thresholds and transformations of the self in the world.

Of course, none of these transformations can ever occur unless educators themselves become empowered (Evers, Kneyber, 2015), so that they may lead by example, manifesting self-guided learner qualities. The need to raise a generation of self-guided learners does not imply that teacher profession becomes obsolete; quite the opposite, it is most often through teachers that are inspirational, empowered, and passionate about their work and life, that students gain their self-guiding ability. Originally, the word “teacher” was used in the spiritual and religious context, to denote holders of wisdom that helped their students in facing and addressing existential challenges, in passing through thresholds, in finding deeper foundations within their lives. This role is becoming increasingly important, as we move into more volatile, uncertain, and complex futures.

In the emerging “VUCA” world, education is not a destination point to which one arrives prepared for a certain trajectory in life or career, but rather education must be a lifelong journey of personal and collective growth,

Two main things define democratic education. First is that they are run by democratic bosses. Second is that every student has a different learning plan. Children can choose what they want to learn, how they want to learn, with whom they want to learn, when they want to learn.



YAACOV HECHT,
Founder of International
Democratic Education move-
mentn

⁵⁰ <http://phys.org/news/2011-07-minority-scientists-ideas.html>

⁵¹ Marc Prensky extensively writes on project-based learning as a necessary part of new curriculum, e.g. [Prensky, 2014]

⁵² E.g. <https://link.springer.com/article/10.1007/s10648-008-9082-7>, https://www.researchgate.net/publication/259367418_Effects_of_Project-based_Learning_Strategy_on_Self-directed_Learning_Skills_of_Educational_Technology_Students_and_others

⁵³ <http://www.sciencedirect.com/science/article/pii/S1877042814066804>

EDUCATIONAL PROJECTS WORKING WITH COLLECTIVE DIMENSION OF LEARNING

Team focused learning has become a fad with the rise of startup accelerators. Educational providers such as **Y Combinator** and **500 Startups** consider successful teams with proper skills to be the primary result of the programs. Similarly, some entrepreneurship-oriented universities such as Dutch **Team Academy**, or business schools such as **MIT Sloan** and Russian **Skolkovo School of Management**, focus on developing collective capabilities of teams and even whole cohorts of students, not only individual learners. More systemically, coordinated development of collective capacities – including communities of practices, companies, research streams and infrastructural spaces – is accomplished by efforts such as **Joint Venture Silicon Valley** or Russian **National Technological Initiative**.

Team-based learning using collaborative problem solving and peer-to-peer learning is effective at various levels of education. **Team-Based Learning Collaborative** in the US promotes its use across schools and universities, while **Connected Learning Alliance** advocates the use of team and community based online learning. Tradition of successful application of community-focused learning in European pedagogy can be found in **Waldorf schools** created by Rudolf Steiner in early 20th century,

and in **Russian “communal life”** learning methods that were developed by Stanislav Shatsky, Anton Makarenko, and Igor Ivanov throughout the first half of 20th century. As a recent example, coding school 42 provides an example of low-cost high-efficiency training of programmers through team-based problem-oriented peer-to-peer learning that doesn’t at all involve teachers or trainers.

Many indigenous communities used collaborative learning as a dominant form of learning, whereby mothers, fathers, and their children, or just any members of the tribe at any age, would collectively get involved in problem-solving and tale-telling. This is a learning for new tribal members as well as for a tribe as a whole. In particular, many accounts of such learning have been recently documented for **Mayan tribal** communities in Guatemala – but there are evidences of similar patterns of learning from indigenous communities in Africa, Latin America, South East Asia, and Oceania.

New Zealand has made a considerable effort in adopting **Maori tribal** learning models and mashing them up with European curriculum and pedagogies, to create schools that employ indigenous collective learning practices for 21st century education.

development, and co-creation. We must learn how to learn together in a way that fosters not only self-guided learning skills, but also in a way that evolves the character and quality of our learning processes throughout the life cycle. An important trait of a self-guided learner is one’s ability to co-create lifelong holistic educational experiences that empower others as self-guided collaborators.

B. Creating Team, Community & Network-Based Education

Education is usually described as a process that supports personal development and skill formation. Of course, the process of learning can occur in groups and teams, but the final “output” of educational institutions is most often thought to be individualized, and this is reflected in the design of learning experiences, assessments and evaluations, and qualification awarding in further use of educational results in personal careers. However, education (especially professional adult education) becomes increasingly engaged in the development of collective competencies within teams, orga-

We must transcend the notion that entrepreneurship is individual – it is in fact a collective phenomenon.



HENRY ETZKOWITZ,
President, Triple Helix
Association

nizations, and communities – in particular, because it creates competitive advantage for universities, corporations, cities and other large social systems to increase the creative and agential potential of collectives. Businesses and social agencies transform themselves into learning organizations by developing practices that are similar, on a collective level, to some of the key skills of self-guided individual learners [Senge, 2000].

Although we as human beings are social/communal animals best suited for collaborative mutual benefit, our society has been moving toward individualized and nuclear modes of being. As suggested above, as self-guided learning increases, it is equally important that education moves from its current highly individualized focus toward integrating individual competencies with collective competencies to create “synergies” between teams, communities, and networks of learners and leaders. This phenomenon was perfectly captured by Ivan Illich in the notion of conviviality, “autonomous and creative intercourse among persons, and the intercourse of persons with their environment” [Illich 1973, p. 24] that makes it possible to achieve the existing levels of collaboration in the society, and scale up to new levels. Furthermore, as we start rebuilding organizations and educational systems around learning cultures we shall see the rise of the unified contribution of self-guided learners co-creating synergistic teams, groups, and networks of varying sizes.

It is not enough to acknowledge that collective learning processes do exist, and that they can be influenced by educational systems. Educational institutions and (eco)systems of the future ought to be designed in such a manner that they are capable of working with individuals as well as with collective learning processes. This will require, among other things, the creation of learning environments and processes that:

- ◆ Generate and maintain meaningful collective purposes, identities, and actions that stimulate co-creation, collaboration and collective learning
- ◆ Allow people to collectively explore, co-create and co-evolve within agendas that are interesting and stimulating to all of them, and through that to experience “belonging to something bigger”
- ◆ Support people to create innovations, artifacts and other products that are relevant for a larger community, and thus maintain purposeful exploration, co-creation and collective belonging
- ◆ Establish regular reflection spaces dedicated to collective being and acting, and offer ways of achievement tracking and competency assessment congruent for groups/teams/communities
- ◆ Foster collective evolution including the exploration of boundaries of self/collective in a meaningful way, challenging consensual views and

In a peer-learning process, people learn both collaboratively, as they work together on projects, and cooperatively, as they have some knowledge of each other's interests and bring something to that kind of potlach. It's a learning group, and that's a whole lot more powerful than one person, a teacher, bringing something to it.



HOWARD RHEINGOLD,
Founder of Rheingold University

⁵⁴ <http://www.p21.org/news-events/p21blog/1489-garcia-increasing-self-directed-learning-in-the-early-grades>

⁵⁵ An essay by Alexa Clay provides an interesting perspective on live action role playing as a vehicle for social change: <https://aeon.co/essays/can-live-action-role-play-games-bring-about-social-change>

⁵⁶ An example of a school fully based on live action role playing is Osterskov Efterskole in Denmark: <https://www.ft.com/content/b334feae-f884-11e6-bd4e-68d53499ed71>

processes of the group (the right to disagree, the right to say “no”, the right to leave).

Finally, personal and collective learning processes can be unified – collective learning space serves individual self-development and self-realization. It is therefore necessary to weave the development of collective competencies (that work in the interest of communities and large social systems) with processes of individual development in such a way that individual learning experiences become the next organic step in community development. Full synchronization of individual and collective learning processes is one of the key conditions of creating “new” lifelong education – education/learning that is everywhere, all the time.

Everybody learns by their path. There is no idealised holistic learner.



GEORGETTE YAKMAN,
Founder of STEAM Education

C. Emerging “Glocal” Educational Ecosystems

Learning needs across a learner’s lifecycle widely vary, as do the contexts in which learners apply their learning. Furthermore, the collective or collaborative element of learning teams, communities, and networks imply a relational and cultural innovation process that learners must be prepared for at accelerating and increasing rates. Educational processes therefore, must be able to respond to learners’ varied and evolving needs as well as the pace of change in our systems.

In contrast to the inflexible educational institutions of “industrial” era education practices, learning ecosystems provide a means to integrate a diverse milieu of learning opportunities in a holistic and life affirming way. An educational ecosystem can be defined as *a dynamically evolving and interconnected network of educational spaces, with individual and institutional providers, that offer a variety of learning experiences to individual and collective learners across the learning lifecycle*. Educational ecosystems can integrate both live and online spaces and bring together holistic or “integral” opportunities for individual and collective development across a wide spectrum of human endeavor. They also attend to needs that emerge and evolve over one’s lifecycle, including needs for transitions or passing through thresholds of ages, social roles, and levels of mastery – the processes of *initiatory education* that need to make their way back into our culture.

The notion of ecosystems, that started to permeate educational discussions since early 2000s, still has a variety of meanings behind it. To some, the emphasis is on the balance between multiple roles of stakeholders, including teachers and learners⁵⁷; others allude to the potential to challenge the conventional educational system⁵⁸. Increasingly, it has also come to indicate the variety of technology solutions available to primarily individual learners and sometimes to learning organizations.

⁵⁷ One of the earliest uses of this notion in education, describing the innovative approach of Virginia Polytech indicates: “Educational Ecosystem involves assets and interests of all stakeholders (faculty, students, industry, community, and specific individuals within each of these categories) combined to achieve synergistic results that benefit all” (Pearce, McCoy, 2007)

A remarkable paper by Hannon et al. (2011) suggests that “learning Ecosystem fosters connections between formal and informal learning, between existing providers and new entrants, and between „service providers” (mostly teachers) and „service users” (mostly students)”

⁵⁸ The report by Knowledge Works (2012) indicates that “Learning Ecosystem enhances teaching and learning uncoupled from traditional educational institutions”

The study of evolutionary biology, where the notion of ecosystems originate, offers a much more precise definition: an ecosystem is a community of living organisms in conjunction with the natural nonliving environment (air, water, soil etc.): a forest, a coral reef, or a lake [Chapin et al., 2002]. With this definition in mind, some of the key aspects of biological ecosystems traits translated to the educational ecosystem context can include:

- ◆ **Diversity:** Multiple providers that fulfill many roles, allowing for “structural stability” of the ecosystem
- ◆ **Maximum productivity and resource cycling with the ecosystem:**
 - ◆ Multiple providers engage in mutualistic relationships processing and re-distributing various key resources to each other, including interested learners, knowledge, quality assurance, and funding (contrary to earlier educational systems that often tried to take control over learner’s pathway, appropriating learners’ fates and fostering competition)
 - ◆ Ecosystem creates “ultimate benefit” for the society (i.e. provides for skills training on scale comparable with TVET system, and with higher quality/lower cost)
- ◆ **Dynamic adaptability:** Ecosystems can adapt and respond to learner needs and changes of institutional environments (this is the critical feature that distinguishes ecosystems from earlier, and more rigid, approaches of educational system centralization)
- ◆ **Scalability:** Ecosystems can operate on various scales, from learner groups or specific schools to the planetary community.

Accordingly, a full-fledged educational ecosystem is an open and evolving community of multiple providers that cater to the variety of learner needs in a given context or area. An area or a region becomes a minimal unit of a learning system – whereas a single institution (school/university ...) is never a full ecosystem of its own, though it can become a central structural element of such a diverse learning and teaching community (much like a large canopy of a large oak tree can host organisms from moss to birds). A full ecosystem requires not only providers, but also a variety of “connectors” that design learning pathways through the system, help to track and record achievements, identify and connect shared resources, etc.

Therefore, an educational ecosystem is localized; it serves local needs and connects learners within a context. Yet, it is natural in our increasingly globalizing world that learners also turn to an abundance of sources that

Learning is not something that happens in the university or a classroom anymore. The world today is a university, and we have to figure out how to use all those resources and all those experiences from local to global.



GARRY JACOBS,
CEO, World Academy of Art
and Science, and CEO, World
University Consortium

GROWING EDUCATIONAL ECOSYSTEMS

Educational ecosystems are an emergent concept that indicates an emergent phenomenon of organizing educational systems that can be observed around the world. Groups that strive to create learner-centered community-driven integral ecosystems for lifelong learning currently operate as regional regulators and social entrepreneurs in Catalonia (Spain), Wales (UK), British Columbia (Canada), Vienna (Austria), Shenzhen (China), St. Petersburg (Russia) and many other regions. One of the most significant experiments to connect in-school, out-of-school, and online learning experiences and career opportunities for youth is **LRNG**, a movement to create 21st century ecosystems in various US cities beginning with Chicago. Ecosystems are also currently catalyzed and shaped by online learning platforms (e.g. edX global learning ecosystem) and university networks (e.g. Laureate Universities). Some areas with well developed conventional educational institutions and a variety of alternative education opportunities, from New York and the San Francisco Bay area to Moscow and Shanghai, are already naturally functioning as educational ecosystems that hold multiplicity of learning streams and experiences. A recently established **Global Change Leaders Collaborative** (of which Global Education Futures is a part) aims to

(cofounded by Global Education Futures) aims to seed and spread educational ecosystems around the globe in order to empower one billion people for the greater good of our society.

The rise of educational ecosystems is catalyzed by ecosystem mapping which helps identify and connect a variety of learning providers and venues (mapping projects by **Brookings Institute**, **R4D**, **Matterfund**, **Ashoka Foundation**, **ReEvo**, **AERO**, **HundrED**, **Knowledge Works**, and **SOI Foundation** are currently among the more advanced). Collective vision building and future-oriented relationship building helps to raise ecosystems, as variety of players begin to recognize shared interests and work towards systemic goals – instruments such as **Rapid Foresight**, **Structured Democratic Dialogue**, and **FutureLab**, among others, serve this purpose. Coupled with applied systems thinking for ecosystems (cultivated in many research groups, from **Saybrook University**, **ITBA**, and **OCAD University**, to **Bertalanffy Center for the Study of System Science**, **Fraunhofer Institute for Systems and Innovation Research**, and **Schedrovitsky Foundation**), helps shape and steer the development of educational ecosystems.

provide better quality learning experiences – i.e. massive open online courses, distributed online communities, blogging platforms, educational games in virtual reality, and many more. If these learning spaces receive an influx of interested learners and created communities, this creates “network effects” attracting even more learners. Because these approaches to educational ecosystems are no longer constrained by physical presence in one place, learning communities will become increasingly global.

The emerging reality of educational ecosystems is therefore “Glocal”: they are the nexus of global and local models, providers, competences, and more (see Figure 4).

An increasing presence of global learning resources can be both stimulating and disruptive for localized learning communities. Global resources can substantially amplify the potential of individual and collective learners in the area, and help connect them with their peers worldwide. This is partic-

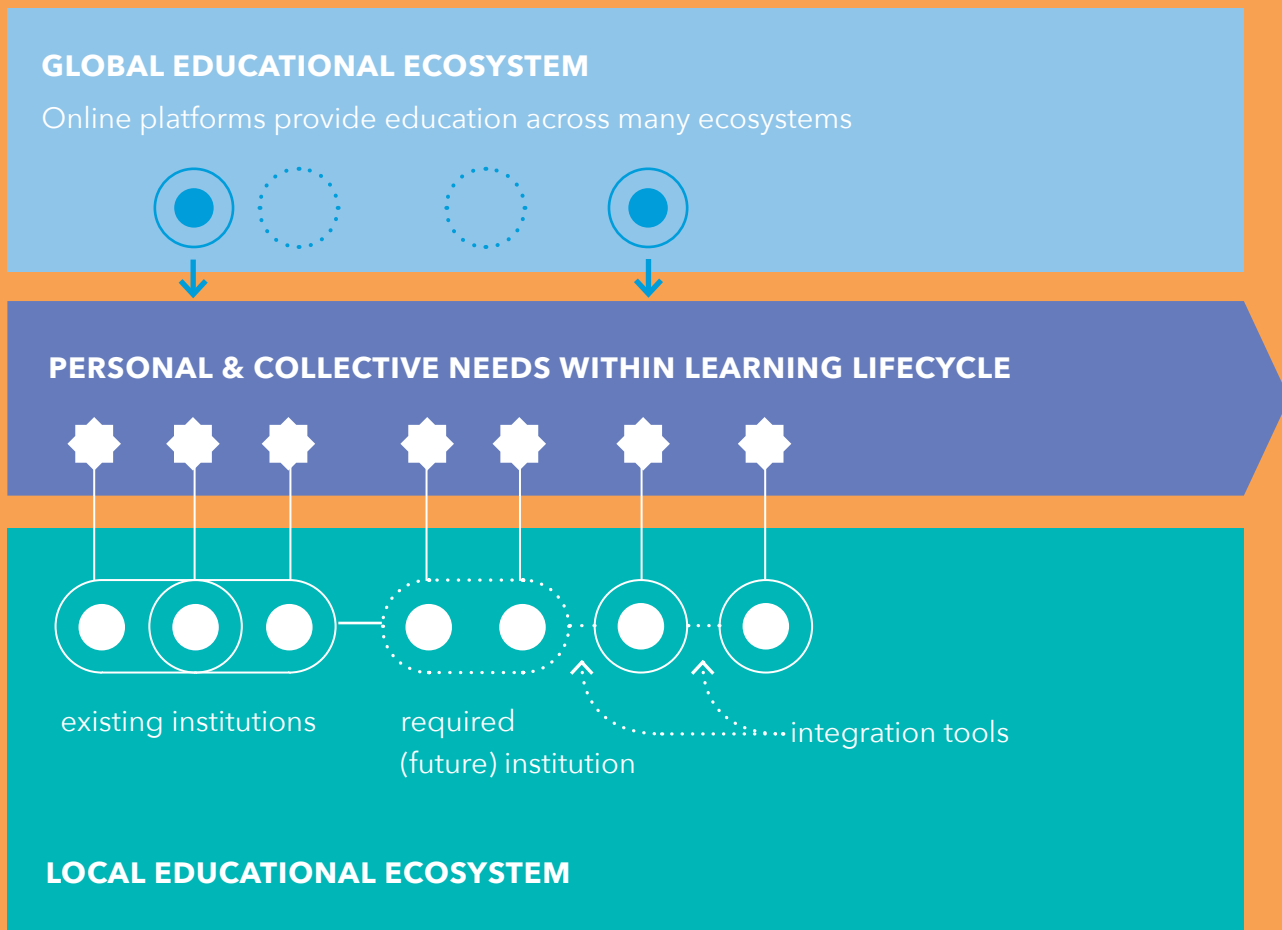


Figure 4: “Glocal” educational ecosystem as a nexus of global & local ecosystems that cater to personal & collective learner lifecycle

ularly important in less developed areas of the world where local learning resources are limited, and where there are high barriers to resource-rich opportunities. Additionally, the increased presence of global resources also has the potential of devaluing locally situated knowledge, and may lead to a softer version of cultural colonialism that still destroys cultural richness and diversity. The edge between providing the best learning opportunities in the world and devaluing local learning opportunities is subtle. Much like it is the responsibility of industrial corporations to minimize the

negative impact of their business upon natural environment – it also should become an ethical responsibility of designers and providers of global learning experiences to create opportunities to merge their services with various forms of localized education, including community based and indigenous forms of learning.

D. Evolving Learning Success Metrics

Throughout centuries of “industrial” education the role of metrics for success or learner assessment has been used to separate seemingly high-talented from low-talented learners, outcasts from intellectual elites. While this role of assessment will likely remain as long as our society remains hierarchically structured, we also know that often “outcasts” from traditional educational systems become top performers in life and society: a widely cited example is that Bill Gates, Steve Jobs, and Mark Zuckerberg were college dropouts who are currently seen as some of most successful people of our age. Evaluation and assessment systems of the past may not be best suited for guiding people toward desired combinations of skills for the 21st century. We need to acknowledge the limitations of assessment – and redirect the impact on people’s life, especially for young people so that evaluation and assessment can be experienced as valuable and encouraging feedback; it is time to evolve the role of evaluation and assessment so that it promotes our best and advances our evolving learning goals.

While knowledge-based assessment of cognitive abilities such as reading, writing, arithmetic, memorization of facts and dates, and/or template-based problem solving are tangibly understood by conventional assessment and evaluation through standardized and automated testing, many of the most increasingly demanded skills in the 21st century are less tangible and therefore more challenging to access with traditional methods. Social and emotional intelligence, creativity, and our abilities to cooperate and co-create as well as other critical skills of the future must therefore be included in how we define learner’s successes throughout the cycle of life-long learning. We need to accept the challenge of measuring these abilities as a metrics of “academic success”, and measure them in new and dynamic ways, as “creative profiles” describing range of multi-modal abilities. Most essential, we should also assess people in ways that do not destroy curiosity, creativity, and cooperation – and that allow people to learn by making mistakes⁵⁹.

We need to transform assessment to address transformation of our society. Assessment instruments haven’t really evolved since 1950s, it is the area of education where the least progress has been made.



ANDREAS SCHLEICHER,
Director for Education
and Skills, OECD

“Ranking is very destructive because in the world we live in, we don’t care about how people rank on the same criteria. We care about each individual strengths, they bring something unique to the world. It would be great if every kid knows where and how they contribute best.”



MARC PRENSKY,
Founder of Global Future
Education Institute

NEW METRICS OF LEARNING “SUCCESS”

Competency based education becomes increasingly popular in vocational, higher and secondary education. **Competence-Based Education Network** is a US-based national consortium for designing, developing, and scaling competence-based models of learning. **CBEinfo** and **Competency-Works** are online resources that provide tons of information about this approach in higher education and K-12.

A number of services are focusing on capturing achievements that were obtained during courses, especially online. **Pearson** and **Blackboard** have integrated “achievement badges” within their Learning Management Systems, and **Mozilla OpenBadges** stands out as the independent platform most widely used.

Though at a very nascent state, some projects focus on opportunities provided by big data collected from learners behavior, including wearable devices. **Knewton** and **Kaplan** are among players that employ big data in the context of student testing, while research centers such as **UCLA Center for Digital Behavior** pioneer techniques of integrating conventional student data with the one derived from wearable devices and social media activity. **International Educational Data Mining Society** unites many research

groups interested in applying “big data” to learning analytics and prediction of learners’ behavior.

At the system level, new metrics are sought to capture non-cognitive skills (such as creativity and collaboration) in ways that would allow comparison across institutions and regions. In particular, **OECD** revised its **PISA** and **TALIS** testing approach to measure “global competency”* aiming at 2030 anticipated learner needs. Other recently developed metrics include employability of graduates (see **QS Global Employability** ranking) and entrepreneurial activity (based on methodology used by **Kauffman Foundation**).

Despite benefits offered by more precise measurement of “success”, the downside of metrics is also obvious: any metrics, no matter how good, can introduce polarization within learner groups and alienate some learners from their learning experience. It is why “some things should not be measured”. In this spirit, school movements such as **Krishnamurti schools** or **Democratic schools** limit or eliminate assessment and measurement.

* See definition in <http://www.oecd.org/pisa/aboutpisa/Global-competency-for-an-inclusive-world.pdf>

Metrics of achievement can become transferrable, i.e. they can be designed in a way that will allow learners to move between learning ecosystems smoothly and organically, tracking all learning processes and outcomes while at the same time offering empowering feedback – whether it is a university course, an online platform course, a public lecture, an internship, or social experience etc. Creating such “transferability” is a gradual process that would only happen through coevolution of global and local learning ecosystems, and capacities of learners themselves, who will have to develop broader vision by which they can situate their cultural locales and societies into the greater context of global trends and challenges.

The measuring of competencies, and learners’ ability to act, create and co-create, rather than simply testing their knowledge- base, can lead toward a set of re-defined metrics of success and learning that integrates critical and creative learning capacities for both personal and collective advancement throughout one’s life and society. Rather than relying on

The question is not how to make a better evaluation system, but whether we need to have an evaluation system. Evaluation can be destructive [to human learning], and it is not something to be imposed.



JERRY MINTZ,
Founder of Alternative Education Resource Organization

traditional diplomas, qualifications, or certificates-achievement which become increasingly irrelevant⁶⁰ – learners may develop competence-based learner profiles⁶¹ and/or portfolios of action learning and research that recognize the cumulative knowledge building in all aspects of a person's life and represent abilities and talents in real world application. Unlike diplomas, such a passport of competencies is as unique as one's image in the passport. Furthermore, reputation as an additional way of tracking learners' manifested abilities partnered with a "competence portfolio" approach has the potential to form a new set of building blocks that shift the nature of educational success metrics. Through competence and reputation metrics we can create platforms (including application programming interfaces, or APIs) that connect a multitude of learning spaces and experiences across a learning success spectrum⁶².

Metrics that were largely designed and administered based upon previous models of education that focus on knowledge retention and separating life stages between youth and adulthood, or education from vocation may in fact decrease the capacity of learners and in turn our society to meet the demands of our future opportunities and challenges. The time has come to move to new platforms that better suit needs of 21st century and beyond. We need to establish correlation between credentials and capacities in a way that is meaningful to the person's life and aspirations as well as to the society's and planetary needs and the context in which the individual lives. In this regard, we need to challenge the present notion of "success" that is often defined as getting to the top of the game, winning over others, getting most from life – in other words, we need to challenge the dominance of competitive, self-serving, selfish relationships in our society. The success that is done at the expense of others – and not only other human beings but also other living species – may be a short-term gain but a long-term failure. That, among other things, may mean that we need to introduce metrics that emphasize our ability to collaborate (including assessment done on communities of learning, e.g. project teams, rather than individuals). The ultimate purpose of redefining metrics of "success" is to develop a learner's fingerprint that one leaves in the world and, thus, step away from leaving devastating footprints. One's personal imprint would be a signature of a presence that left a contribution mark for the service of the greater humanity and our planet.

Considering the "metrics of success", we need to revisit and redefine our idea of progress. We should be expanding our care, not our material resources.



ANNELOES SMITSMAN,
Founder of EARTHwise
Center

⁵⁹ See Eric Mazur's lecture on assessment as "the silent killer of learning": <http://www.thecrimson.com/article/2013/10/30/applied-physics-professor-grades/>

⁶⁰ <https://hbr.org/2014/01/the-degree-is-doomed>

⁶¹ See some best practices in competency based education assessment in <https://www.luminafoundation.org/files/resources/measuring-mastery.pdf>

⁶² See overview of practices of educational data mining and learning analytics that set out pathway towards such cross-platform systems: <https://tech.ed.gov/wp-content/uploads/2014/03/edm-la-brief.pdf>

2.3 Self-Guided Learning for Individuals & Communities

For self-guided learners (both individuals & collectives) to be successful in achieving and evolving their intentions over time learning spaces must be designed to support learners evolving needs. Any given educational ecosystem, in order to be fully operable, needs to create tools and processes that support all of the following “building blocks” for personal & collective learning journeys across the human lifecycle (Figure 5):

- ◆ Processes and tools that help (personal and collective) *learner’s goal definition* – and analysis of *learner’s motivation/preferred learning style* (i.e. learning in competitive environments, in collaboration, or through individual exploration; inner or outer rewarding, etc.)
- ◆ Learning processes, integrated into a *learning journey*, that develop various (mental, social, emotional, physical ...) aspects of personal and collective being through holistic learning experiences, including play and co-creation
- ◆ Processes & tools that measure *learning outcomes* such as new gained competencies, artefacts created as an outcome of learning creative activity, and reputation gained through participation in learning experience – as well as *indicators of the “quality of the process”* (level of engagement, level of joy, etc.)
- ◆ Educational technologies that support personal/collective learning processes, including virtual personal assistance and various learning resources;
- ◆ Learning spaces and educational technologies (including “marketplaces” of learning experiences) *that help connect personal and collective learning journey*, by aligning individual learning needs with developmental needs of communities.

These “building blocks” can be integrated within, and supported by, ecosystemic learning management systems that unify personal/collective learning trajectories, and connect them with various learning spaces and learning opportunities. In this model, formal educational institutions can exist among the venues that provide various learning experiences, or they can become “hubs” of learning ecosystems where these learning journeys are connected and supported through educational technologies including:

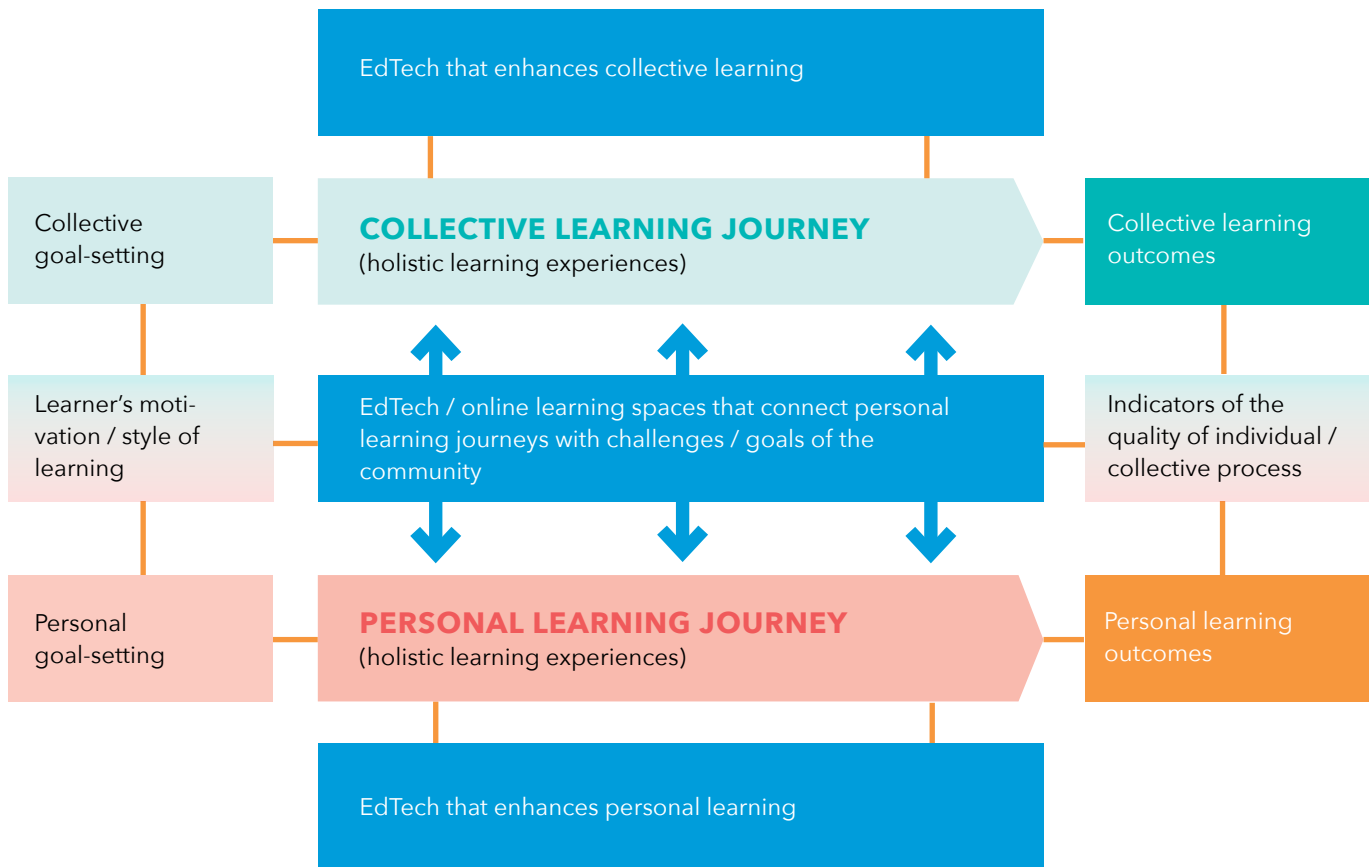


Figure 5: Key elements of "learner's journey" across individual / collective lifecycle

- ◆ Enhancement of personal learning processes (with data analytics/artificial intelligence/specific educational applications): virtual tutors/personal assistants that can help guide a learner through one's personal journey; personalized interactive learning materials and applications; personal wearable devices that help track user's psychophysical conditions, etc.
- ◆ Enhancement of collective learning processes: virtual collaborative assistants that help improve group collaboration and co-creation processes; tools and technologies for collective self-regulation, and more
- ◆ Connection of personal and collective learning processes:
 - ◆ Knowledge depositories (i.e. libraries of books, articles, and simulations, online encyclopedia, etc.) and online learning platforms (with curated learning content)
 - ◆ Spaces for peer-to-peer and mentor-based learning, including social networks and online "game universes" (incl. those with virtual and augmented reality)

⁶³ In fact, job search is one type of such a place, where an existing set of competencies is exchanged for a monetary compensation and a learning opportunity (as experience and prospective career opportunities are seen as part of the agreement). We have described such "markets" in more detail in our earlier 2014 report.

⁶⁴ Though, being an emergent quality and a synergistic phenomenon, collective learning is not fully reducible to "sum of its parts", and produces collective competencies that are derived from connections between learners, and are unique for any specific learning communities.

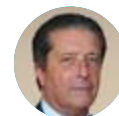
- ◆ “Marketplaces” that connect individual learners with learning opportunities that exist within organizations & communities (incl. requests for project/task/play participation). These “marketplaces” can be envisaged as job search platforms with a wider functionality⁶³.

As individuals may participate in one or several learning communities, it is necessary to create synergy between given learners experiences and their interrelated learning communities or teams. Collective learning spaces and endeavors provide learning opportunities for individuals by offering them specific roles and assigning them with specific tasks in a collective learning process. Thus, collective learning embeds a combination of individual learning experiences⁶⁴. (See Figure 6)

In the context of self-guided lifelong learning that serves both individuals and communities, both the words “education” and “learning” may not fully capture the meaning of new practices that help people acquire necessary knowledge and skills, develop, self-improve, actualize their potential, and work towards a better future. It is suggested that learning gradually evolves into “becoming”, a more encompassing term that is applicable to young as well as adult and senior learners⁶⁵. We need to engage in the search for new words that will carry the qualities we want to see in the emerging reality of learning, anchoring and propagating new social practices.

The next section explores in detail how various elements of the learning ecosystem can be organized in a (individual and collective) learner-centered education.

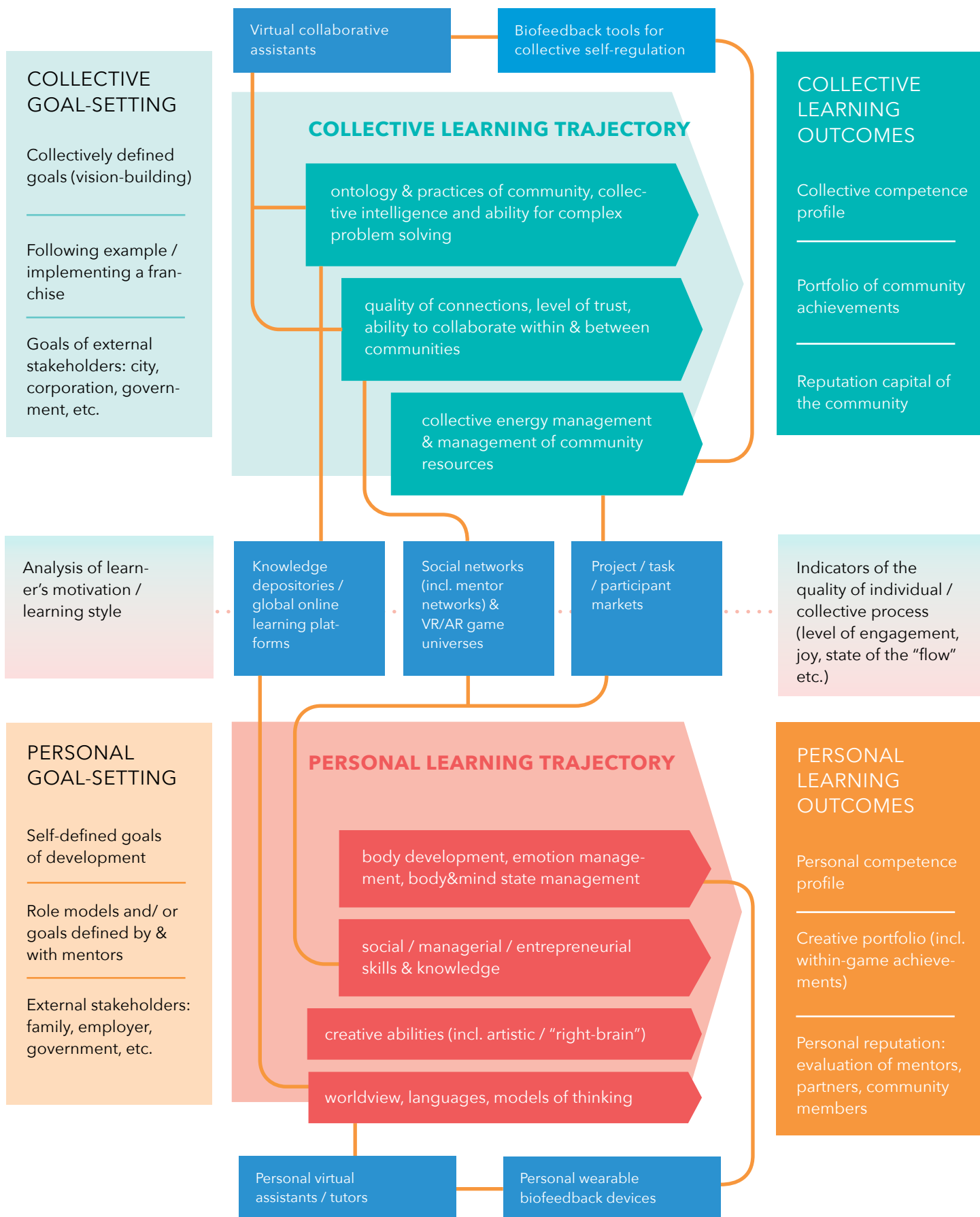
The four pillars for promoting genuine education in the 21st century are: learning to be a full human being; learning to know; learning to do; learning to live together. To these, I would add - learning to dare; learning to undertake.



FEDERICO MAYOR ZARAGOZA,
Chairman, Foundation for a Culture of Peace, and former Director-General of UNESCO (1987-1999)

⁶⁵ The concept of “becoming” has been proposed by Gilles Deleuze, and has been taken on by many prominent thinkers on education and human development, including Paolo Freire, Marc Prensky, Jean Lave & Etienne Wenger, and many others

Figure 6: Detailed representation of “learner’s journey”



3

EDUCATIONAL ECOSYSTEMS: A NEW HORIZON

We have only just begun the process of discovering and inventing the new organizational forms that will inhabit the 21st century. We need the courage to let go of the old world, to relinquish most of what we have cherished, to abandon our interpretations about what does and doesn't work.

MARGARET WHEATLEY

3.1 Elements of Learner-Centered Ecosystemic Environments

One of the definitive features of emerging educational ecosystems is that they have greater diversity of learning opportunities compared to conventional educational systems. An ecosystem can comprise schools, sport clubs, STEM/STEAM clubs, libraries, civic centers, and more – and it can also include online courses and forums, mobile apps, gadgets, augmented reality apps, “game universes”, and many other education technology formats. An ecosystem does not come to destroy and replace the existing system – it emerges upgrading systems to multidimensional spaces that can provide a range of learning experiences to any type of individual and/or collective learners.

From the learner’s point of view, this multidimensional space (Figure 7) is organized across at least two axes:



Figure 7: Organization of learner-centered educational ecosystem

- ◆ **Local/global:** some learning experiences are built around local content and physical contact (such as urban learning or local group projects in a school), whereas other learning experiences are based on global contexts and distributed interaction (such as global learning platforms)
- ◆ **Human/technology:** some learning experiences occur as learning from peers and mentors, while others are created by educational technologies such as online learning spaces, videogames, and wearable devices.

In addition to schools and universities, which will gradually evolve into “central nodes” of educational network spaces (Section 3.6), at least three other spaces will become increasingly relevant and accessible:

- ◆ Global (online) learning platforms will become ultimate providers of global knowledge and content
- ◆ Urban learning formats will continue to develop to serve a larger range of lifelong learner needs
- ◆ Lifelong learning spaces will be built around tech-intense personalized experiences and collective experiences of human interaction and co-creation

3.2 The New Role of Global Learning Platforms

At the moment, online learning is considered complimentary and experience enhancing as compared to face-to-face learning. This idea continues to encourage more schools & universities to adopt blended learning in their curriculum and create blended-learning friendly classrooms. The most important problem resolved by “new” education, and global learning platforms in particular, is the increased value of time for learners, teachers and administrators.

Gradually, learning shifts to mobile platforms, detaching the learning process from traditional venues like the classroom and university. Increasingly, costly face-to-face education in industrialized countries is leading to vast inequalities among students and among broader population segments. Such disparities could well polarize societies and encourage people and populations to shift to global learning platforms. Within 15-20 years, online learning (enhanced by mobile connectivity, wearable gadgets and augmented reality technologies) may globally become a dominant form of learning. Among other things, the proliferation of online education may displace some forms of knowing such as memorization while other forms of knowing such as discernment become ascendant.

Of course, to move into a more advantageous position, global learning platforms will have to resolve several systemic challenges:

- ◆ Online learning currently gets little or no credit and trust from the job market and the conventional educational system. There yet exists no transparent way to establish the quality of courses. Furthermore, there is very limited quality of assessment and assessment security – in other words, there is no guarantee that the course has been taken or the exam has been passed by the person that claimed to take it, unless significant investments are made into relevant technologies and processes⁶⁶. On the policy side, it is also necessary to help “build bridges” between online learning spaces and traditional learning ecosystems, encouraging the variety of blended learning experiences
- ◆ Second, motivation remains one of the major issues: for instance, MOOC completion rate are found to be below 7%⁶⁷. Among many possible explanations, one stands out: online learning remains highly complimentary, and a completion of the course usually does not influence the professional or educational progress of a learner. Again, gaining trust with employers and academia remains a bottleneck
- ◆ Third, online courses have been treated as disconnected, standalone events or “one-offs” – whereas educational degree programs usually

⁶⁶ <http://www.npr.org/sections/ed/2015/04/11/397295495/the-future-of-free-online-courses-new-research-from-mit-and-harvard>

⁶⁷ <https://www.timeshighereducation.com/news/mooc-completion-rates-below-7/2003710.article>

provide connected and interrelated curricula [Zemsky, 2014]. There is, therefore, a need for agents or platforms that will serve as “integrators” of various online learning experiences, or will help create and manage learning journeys (see Section 3.6 below)

- ◆ Finally, despite the wide range of possibilities offered by the new media and ICT, online platforms have been insufficiently innovative (and therefore cannot be seen as “disruptors”): according to the Observatory for Borderless Higher Education, online education has created significant change only in one of twelve dimensions of educational innovation (delivery mode), insignificant changes in six dimensions (e.g. cohort and pedagogy), and retained status quo in five other dimensions (e.g. cost, outcomes, and accreditation)⁶⁸.

Once the present challenges of online learning are resolved, the potential growth of global learning platforms is unlimited – for example, Anant Agarwal, the president of EdX, hopes that the platform will be able to reach one billion students by the mid-2020’s⁶⁹. While EdX is as yet nowhere near that figure, its main objective for now is to develop a model that would be able to work at such a scale. It took Facebook a little over a decade to grow from a startup idea into a platform actively used by a billion users, and 2 billion is likely to happen in 2017⁷⁰. LinkedIn, being a more specialized social media, nears 500 million users⁷¹. If these networks decided to propose online learning opportunities and encouraged users to take them, a figure of a billion online students can be reached fairly quickly. But even if these and other “giants” of online business do not immerse themselves in educational services, the growing access to Internet all over planet (e.g. there were 2 billion smartphone users worldwide in 2016, and they are expected to climb to over 6 billion by 2020⁷²) creates increasing opportunities for learning with global online platforms.

As knowledge management gradually moves from traditional institutions (limited by physical space, time of work and number of participating individuals) into network-like online knowledge creation communities, these communities start to build new kind of “knowledge ecosystems”. Early prototypes of shared knowledge ecosystems are represented by platforms such as arXiv, PLoS and Wikipedia⁷³ – global knowledge repositories collectively managed by a self-organized communities of authors and readers. Over time (within next 15-20 years or more), such ecosystems will replace traditional institutions of knowledge capturing. Also, knowledge storage will increasingly be digital, and so it is expected that [digital] codes will gradually begin replacing text as a dominant form of human knowledge [van der Weel, 2011]. Digital models of reality (e.g. biological systems such as cells, organs, whole organisms and populations, and social systems, such as companies, economies, cultures, and societies), will become interconnected and interoperable, allowing them

⁶⁸ See details in <https://www.slideshare.net/OECDDEDU/open-distance-learning-reflections-on-trends-by-richard-garrett-obhe>

⁶⁹ <https://www.bostonglobe.com/business/specials/globe-100/2013/05/18/edx-president-anant-agarwal-aims-reach-billion-students-around-world/Kv5DZOiB0ABh84F4oM8luN/story.html>

⁷⁰ <http://www.theverge.com/2017/2/1/14474534/facebook-earnings-q4-fourth-quarter-2016>

⁷¹ <http://venturebeat.com/2016/08/04/linkedin-now-has-450-million-members-but-the-number-of-monthly-visitors-is-still-flat/>

⁷² <https://techcrunch.com/2015/06/02/6-1b-smartphone-users-globally-by-2020-overtaking-basic-fixed-phone-subscriptions/>

⁷³ <https://arxiv.org/>, <https://www.plos.org/> and <https://www.wikipedia.org/> accordingly

to model complex processes of the world in *silico*. Such digital modeling will bridge “fundamental” knowledge (i.e. theories that describe laws and fundamental dependencies of reality), and “applied” knowledge (methods, technologies, solutions, policies etc.) because same digital models can serve this dual purpose. The speed of “new” knowledge creation will be contingent on how (obsolete) institutions of intellectual private property will engage with these emergent dynamics. Wide adoption of models such as Creative Commons will facilitate the transformation toward knowledge communities.

One of the critical preconditions to the proliferation of global learning platforms is the unbundling (and later, re-bundling) of content. Unbundling/atomization (i.e. decomposition of courses, texts and other learning materials, and converting them into an organized series of knowledge “blocks” or knowledge “atoms”) allows learners to obtain content that more precisely matches their interests and development needs. Also, atomization supports mobile delivery of content – for instance, a user can easily read a small article or watch a short video when travelling. Aggregation, or re-bundling, of this atomized content – including searchable global libraries, curated topical collections, collaborative structured discussions, and personalized courses – allow for the creation of a variety of learning journeys that are suitable for different learners.

Atomization challenges the position of traditional “knowledge holders” (e.g. academic research and educational institutions or content developing companies) leading to conflicts, for two reasons. First of all, existing regimes of IP rights and licensing might well be used to protect the position of traditional institutions and perhaps further secure the relationship between traditional academic research institutions and corporations – rather than incentivizing content creators to contribute their own knowledge, ideas, and artifacts. But if the knowl-

GLOBAL LEARNING PLATFORMS

Among global learning platforms that are more widely known, are massive open online course (MOOC) platforms that are based on the one teacher and many learner’s paradigm. **EdX**, **Coursera**, and **Udemy** were among the first to provide vehicle for popular professors and universities to deliver online courses to large audiences around the globe. **Khan Academy** uses a similar one-to-many approach, but it is a curated collection of teaching materials, initially made by a single professor (and now by a dedicated team). In addition to that, EdX has created an open-source code for other platforms, and a number of national learning platforms (e.g. French **FUN**, Arab **Edraak**, Chinese **XuetangX**, Russian **NOPO**, etc.) have been created on its basis.

Notably less popularity was gained by platforms that promote community-based learning, such as **P2P University**. However, websites dedicated to community-based knowledge creation, from **Wikipedia** and **arXiv**, to professional forums such as **Stack Overflow**, have increasingly important roles for adult and lifelong learners.

There are a very limited number of agency-based community focused projects at this point. **U.Lab MOOC** combines EdX-based online courses with self-organized offline “learning circles”. A similar approach is intended to be taken by **Bridgedale 360**, an online learning space dedicated to transferring knowledge and skills of sustainable living.

edge creation can be traced back to the original source, marking contribution to collective knowledge by individual authors (e.g. with blockchain-like systems), then “atomization” should not be a problem for creators. Over time, as more knowledge migrates into distributed network knowledge creation structures, this conflict will likely be resolved in favor of creators and GLPs.

Second consideration is much more fundamental – it is epistemological, and not organizational. Even though it is possible to decompose many types of knowledge into knowledge “atoms”, such “atoms” are assembled only in certain sequences. For instance, we can define the notion of “natural logarithm” in mathematics only if we have already defined the notions of “exponentiation” and “Euler’s number”. When we deal with other types of knowledge, such as religious texts and art works, every “atom” is contextualized in a highly interconnected system of ideas that can only be comprehended as a whole. If we need to help shape the way of thinking of a learner, this can only be done as a study of a discipline, and cannot be replaced by a multitude of “thinking heuristics”. In other words, “atomization” can only be done in highly eclectic domains of human knowledge (e.g. accounting and finance), while most domains will require more sophisticated approaches, e.g. creating “knowledge trees”.

Finally, a new and important trend is that learning platforms begin to change the modality of their interaction with learners. Today, the majority of platforms still treat their users as “readers”, and courses remain a version of highly interactive “textbooks”. Some platforms would also provide virtual laboratories where students can run simulations and conduct experiments. However, it becomes possible that some platforms become increasingly engaged with learners as tutors / coordinators of their real-life activities. These platforms begin cultivating more engaged, agency-based forms of learning such as project-based learning, in particular addressing the rising population of Self-Guided Learners that prefer an active exploratory context. In addition to serving the needs of more engaged learners, agency-based GLPs can help improve life on a planetary scale, incubating activists’ projects through project-based learning. One of the prototypes of such a platform is uLab MOOC organized by MIT-related Presencing Institute – in this online course, communities of learners in all parts of the globe identify local challenges and create projects and social enterprises to solve them. In the same manner, GLPs can also promote engaging in ethical behaviors for massive groups without imposing doctrinal restrictions. Also, GLPs can be used to help transfer new knowledge and skills to communities/societies in distress or in crisis situations (economy collapse, war, natural hazard, environmental disaster, etc.), or more generally, indigenous and local communities in different parts of the world. Over time, GLPs can become essential in connecting such communities that face similar problems (i.e. poverty, crime, hunger, etc.), or to increase the efficiency of their practices (in agriculture, healthcare, education etc.) to help cross-community learning.

3.3 Urban Learning Spaces & Regenerative Lifelong Learning Ecosystems

Around the globe there is an accelerating wave of urbanization by which the concentration of civic life is moving from rural to small cities to megacities. Currently, already over 50% of all humans live in cities and this number is increasing daily⁷⁴. This momentum invites to rethink the role that cities could play in the development of our civilization, as spaces for intentional, and not only spontaneous, societal evolution. In particular, the fertile ground of megacity educational landscapes can provide the emergence of full-scale “learning ecosystems” that can support the education of a whole person throughout their whole lifetime, and in turn whole communities for the whole world.

For cities, and megacities in particular, to be truly viable will require the application of various social and ecological technologies that increase the safety and comfort of the city, increase the productivity of urban livelihoods, and redefine citywide relationships with the natural environment. Furthermore, robotics, smart environment and “big data” for coordination and management of city processes coupled with healthy food production through urban micro and vertical agriculture and a plethora of innovations in new resource production and waste management processes can make cities a place of natural and cultural regeneration: a source of clean air, water, fertile soil, restored species of plants and animals, and hubs for cultural and creative exploration and expression. Endeavors and approaches to evolution of cities can be accomplished through and embedded in all forms of community learning that can be project oriented (e.g. hackathons and startups that transform city ecology) or practice oriented (e.g. learning about food production as “learning through growing, preparing, and eating”). Efficient management of city resources that is achieved through such collaborative learning and co-creation would allow more public spaces be used for learning and interaction, allowing communities to enjoy and share stewardship of the commons.

Cities, and especially megacities, due to their high diversity, often become the source of various tensions around economic inequality, ethnic and religious differences, and more. In response to the increasing complexity of urban life, some societies try to restrict the inflow of variety and even begin “controlled simplification” of social life⁷⁵. Over time, this may lead to increased instances of violence and social injustice directed at minority or stigmatized groups. Conflict mediation and peacemaking must therefore become widely

⁷⁴ <http://www.un.org/en/development/desa/news/population/world-urbanization-prospects-2014.html>

⁷⁵ The possibility and the risks of “controlled simplification” are deeply discussed by Doug Cocks (2003)

distributed skills to help prevent community and family violence. Also, social media will increasingly become a source of urban activism as a multimedia approach to both organizing and storytelling as a human tradition and skill that can prevent and mitigate conflict by bringing people together and weaving shared vision and values amongst and between people.

Another important dynamic within both cities and rural areas alike is the impact on families through extended connectivity which allows each family member to obtain broader connections with the “outer world”. As ties with communities outside the family strengthen, the ties within families weaken (due to a phenomenon of “*nocializing*” or avoiding socialization in the shared physical space by attaching to digital communications⁷⁶), and family norms and status quo traditions are challenged – traditional roles and family hierarchies are not maintained, and cross-generational transfer of knowledge does not occur. It is often suggested that we begin to live in the increasingly individualistic world, where families are a redundant and even an obsolete convention.

While such technology-driven transformation of one of the most fundamental human institutions, in fact, can be a source of increasing loneliness and disconnection for some, for others it is becoming a pathway into new forms of participation in multiple or shared communities (some of which are described as neo-tribes)⁷⁷. In contexts of hyper-connectivity, families and communities are being redefined, shifting from kin loyalty and economic

⁷⁶ Check out this “acting out” of the concept at <https://www.youtube.com/watch?v=CTtU-UENE7NI>

⁷⁷ See discussions on the future of families in <https://www.oecd.org/futures/49093502.pdf>

URBAN LEARNING SPACES & GLOBAL REGENERATIVE EDUCATION

The variety of urban learning spaces is on the rise – and the list of examples can be very broad. One of the important catalysts of urban change is the **Maker movement** and “maker spaces”, such as **Fab Labs**, particularly embracing “citizen science” and grassroots technological innovation, championed by projects such as **La Pallaïsse Open Innovation Labs** (France). Some spaces dedicate themselves to urban transformation through social entrepreneurship and grassroots social innovation, and Impact Hub global network is among the most notable collective learning spaces in this domain. Learning spaces and initiatives that promote engagement of younger generations that can become the catalyst of change in the urban context are accomplished by many groups including **Ashoka Changemakers**, **AIESEC**, **WE**, or **Young Folks** (Latvia). Integral solutions that blend urban culture, technology, and cross-generational learning, are promoted by many groups around the world including Dutch **City Embassies**, US **Transition Towns**, and Russian **Living Cities** movements.

Sustainability oriented urban and rural development is stimulated by several frameworks including: UN **Sustainable Development Goals** (SDGs), **Framework for Strategic Sustainable Development** (FSSD), **Planetary Boundaries** by Stockholm Resilience Center, and the **Earth Charter**. Various programs of sustainable global leadership and regenerative learning include: Masters in Strategic Leadership Towards Sustainability at **Blekinge Institute of Technology** (Sweden), Doctorate in Leadership and Systemic Innovation at **ITBA** (Argentina), and programs at **Kaos Pilots** (Denmark), **Knowmads Business School** (Netherlands), **Saybrook University**, or **ALIA Institute** (US). The global **Permaculture** Movement, **Global Ecovillage Network**, **Bioneers**, and **Gaia Education** focus on bringing best practices of sustainability oriented education into both urban and rural spaces. Finally, sustainability oriented integral lifelong learning is championed at “global competence centers” and “prototype spaces”, including **Esalen** in California, **Arcosanti** in Arizona, **Findhorn** in Scotland, and **Auroville** in India.

bonding motivated associations to those based on shared values and existential interests. Such families and communities, as they emerge, naturally become collective learning spaces that foster multi-generational community-based engagement and collective learning practices supporting collective peace and health. Such “new” families and communities thereof can become key drivers of collective cross-generational learning in urban contexts.

Due to the proliferation of self-organizing learning communities and the diverse learning opportunities they offer, new “third-space” learning avenues are on the rise. Public spaces, for example, can become venues where communities are established and maintained. Local communities begin to use cafes and other “third-spaces” to connect, share knowledge and skills (in the form of public lectures, leisure clubs etc.), and discuss important community matters through various forms of participatory dialogues. In addition, technologies such as augmented reality will help convert more public spaces into learning space (an “early bird” exemplar of this technology is Pokémon Go that used AR and gamification to encourage people to explore their cities). Self-organized city communities, communities of practice, and co-housing communities can aim to solve local problems through project-based problem- /solution-oriented formats such as local hackathons, maker movement activities, pop-up entrepreneurship etc. Spontaneous and collaborative public art becomes an important vehicle in removing barriers between individuals and communities and engaging “strangers” in dialogues and collective actions. Essentially, communities become places to cultivate humanity and prevent the dehumanization of society that is induced by intensified application of technologies through the enlivening of human creativity and imagination.

The intensification of learning opportunities can ignite engagement in blended learning environments for learners of all ages in such a way that merge formal and informal, and specialized to omnipresent education. Lifelong learning opportunities can then break out of the school and university walls and be increasingly available across cities and in communities: in civic centers, fitness clubs, parks, through city tours, and in all areas of civic engagement. Communities, united by place, profession, values, and lifestyle can become venues for individual and collective learning, shared interests, and real-life opportunities to engage in co-creating shared experience such as, food from farm-to-table, protection of the natural environment, etc. As cities increasingly become learning spaces, new tools will emerge to support individual and collective learning. Among the most important ones may be navigational tools which will couple personal learning trajectories (or interests and preferences) with learning opportunities that exist within the proximity of a learner, in the same way we are connected to the nearest shop, bank, or theater.

We need to create places in cities where people get seeds of innovation they can grow into new development tools for the future.



CEES DONKERS,
CEO QASE, former City
Urbanist Eindhoven

In the longer run, various elements of community-based learning and transformative learning approaches could unify into Evolutionary Learning Communities (ELCs) that provide 'hubs' of learning and provide opportunities for the development of individuals, families, and groups. Evolutionary Learning Communities are united around personal and collective learning interests and are spaces where people learn, create, play, produce, work, explore, and reflect together as to co-direct their collective learning trajectories. By way of their integral, multi-stakeholder, and multiple intelligence focus, Evolutionary Learning Communities provide forums for the revitalization of people, places, and pathways toward healthy systems.

In the following model (Figure 8)⁷⁸ citizens join an ELC to participate in all aspects of collective being, from sharing their knowledge of family life, co-creating art and cultural artefacts, to the collective production of food and starting business ventures together. The main purpose of an ELC is to provide a shared context and a connection point to interact within and between various communities of interest. Artistic, environmental, social and business/entrepreneurial projects come together as a visible "outputs" of interactions, although the primary objective of ELC remains collective being, learning, and becoming.

It should be said that many of these elements can also be (and often are) integrated into spaces that operate on more integral basis and experiment with new ways of collective being (and not only learning and co-creating) – in particular, ecovillages. Such spaces can be seen as regenerative lifelong learning ecosystems focused on healthy, harmonious, holistic living and being – and so, they commit themselves to creating new human cultures where lifelong learning can become an organic way of being. Some of these ecovillages, from Arcosanti (Arizona, US), Damanhur (Italy), to Findhorn (UK), The Farm (Tennessee, US), or Esalen (California, US), are all prototyping different ways of new social organization and integral life – and by that, exemplify many attributes of evolutionary learning communities created around practices such as human potential, natural birth giving and maternity, organic farming, sustainable living, lifelong human-centered learning, and so on. These communities do not fully isolate themselves from urban civilization – instead, they engage in the "productive tension" with it, cultivating and sharing practices that may arise as elements of the new mass culture of our civilization that responds to evolutionary challenges of the 21st century and beyond.

Transformation of urban cultures, and conversion of cities (and other human habitats) into spaces of intentional societal evolution, is further enhanced by programs of transformative sustainable leadership that occur within and outside the traditional academia. These programs – such as Masters in Strategic Leadership Towards Sustainability at Blekinge Institute of Technology (Sweden), or Leadership of Sustainable Systems at Saybrook University (US), or Doctorate in Leadership and Systemic Innovation at ITBA

⁷⁸ The scheme is derived from Russian Cultural Education Hubs movement, and based on earlier contribution of Global Education Futures California session, the group led by Kathia Laszlo

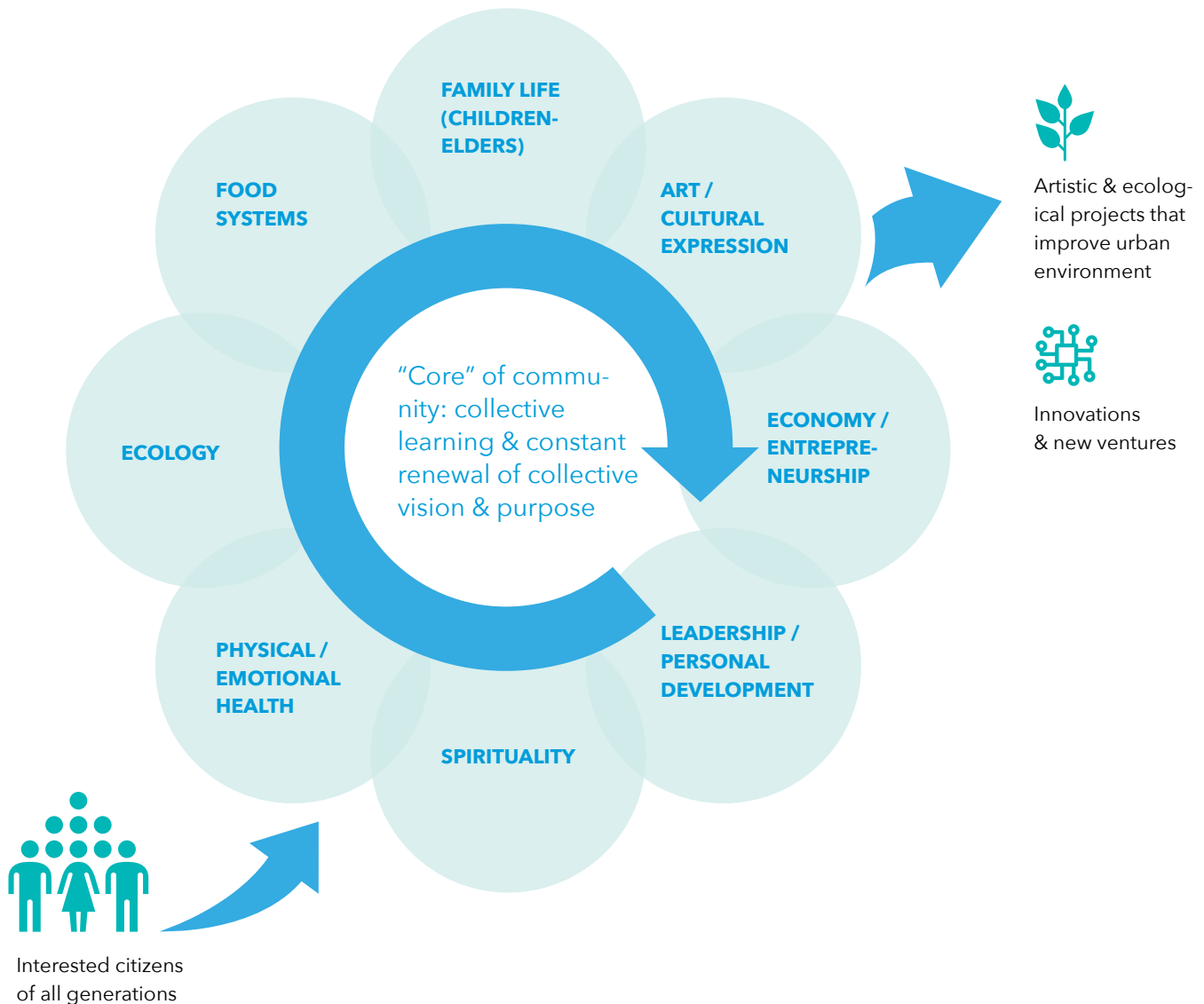


Figure 8: [The model of Evolutionary Learning Community hub](#)

(Argentina) – provide blended approaches that encourage learners to think systemically, design intentionally, and contribute globally to the commons of creative responses and innovations toward a sustainable human presence in our communities, cities, and around the world. The global momentum for revitalization of urban life and modification of economic and social practices to become systemically sustainable and regenerative is catalyzed by global frameworks such as the United Nations Sustainable Development Goals (UN SDGs) and Earth System Framework Planetary Boundaries. In response to this call, communities of practice arise globally to apply sustainability-oriented principles and ethics, fostering regenerative learning and civic engagement to help solve complex social, environmental, and economic challenges of our day-and-age.

3.4 Learning: Face-to-Face & Face-to-Tech

Although the concept of “communities of practice” is only a couple of decades old [Lave & Wenger, 1991], communities of practice are among the most traditional and the most natural forms of learning for humanity throughout our history. A child born into a tribe observed her community and learned through interaction with them, understanding all kinds of practices from cooking and hunting to singing and praying. This form, though ancient, retains its supremacy – to date there is no better way to transfer complex skills to learners (a artist, a scientist, an engineer, etc.) than to include her in real-world practical project-based work. A remarkable success of apprenticeship-based training model in Germany and Switzerland⁷⁹ is built on the premise that learning from and under guidance of “masters” is the best way to obtain any skill, including blue collar skills such as carpentry or plumbing.

Until recent times, the process of inclusion into communities of practice was done on a personal basis. A number of digital technological advancements may foster widespread application of this individual/collective-learning mode, including:

- ◆ Marketplaces of learning opportunities will help to connect the demand for practice-oriented learning and acquisition of new competencies with a “flow” of practical activities within communities of practice, i.e. it will support project involvement corresponding to current levels of competencies and developmental needs of a learner and groups of learners
- ◆ Real-life project participation (that is offered to community members or that is created by them) can be enhanced by mentorship provided by more experienced community members
- ◆ Documenting and assessing outcomes of work within a project, awarding new levels of competence to individuals and teams, and accumulating a knowledge-base of a community of practice can be elements of the same process organized within a comprehensive system of community knowledge management..

Through the above-mentioned innovations, a notable share of learning processes can be organized as a series of activities within various communities of practice that involve their members on a daily, weekly, and annual basis. Communities of practice become not only the space of individual learning, but also the space of team building (in domains of business, art, volunteer work, and more), local community reinvigoration, family reintegration and the unification of learning and contribution.

⁷⁹ <https://www.theatlantic.com/business/archive/2014/10/why-germany-is-so-much-better-at-training-its-workers/381550/>

It is also necessary to consider how a larger variety of learning experiences can be federated. Real-life projects within communities of practice can offer only a limited set of roles within a given context, and primarily for emerging learners the first of these roles will provide primary learning opportunities. However, in any activity it is useful to obtain experiences “for growth” – e.g. a young employee would perform better if she/he knows how and why decisions are being made by supervisors/management of a company. Also, some real life situations (such as a military combat or an emergency) are best to be avoided at all. The best way to learn is to use play-based learning or playification – when various live action role playing games are used, it allows game-dwelling in specially designed gaming “worlds” [Aldrich, 2009]. If project-based approaches connected are real world situations, it allows the creation of a greater variety of learning experiences by introducing “micro-roles”⁸⁰: real-life short-term assignments that are accomplished in different social roles and therefore allow for the development of a larger set of competencies.

Although human-to-human learning is, and will remain a key developmental process, the most efficient form of both assisted and self-guided learning, various forms of technology-mediated learning will increasingly populate educational ecosystems by way of exponential advancements in technology. Educational technology itself is hardly new: from ancient Greek and Roman textbooks to warrior “simulators” used to train Shaolin monks and medieval knights, EdTech is thousands of years old. Despite multiple innovations in education technologies that arose throughout the 20th century (including computer-assisted learning available since early 1970s), they have yet to make a significant shift from “industrial” education models. That said, the recent accelerated proliferation of ICT, and the next wave of improvement Artificial Intelligence and the “Internet of Things technologies”, contribute to optimistic thinking that “this time it will be different”. Above, we have suggested that standalone educational technologies, however powerful, will not transform education unless the pedagogy, the role of teachers, the organization of educational processes, and the role of lifelong learners all change. Nevertheless, the role of technology-mediated learning will increase alongside the digitalization of different aspects of human life. Various types of digital educational solutions already exist as niche products (or as prototypes), and will likely be increasingly present in our lives as the demand for self-guided learner experience grows:

- ◆ “Digital textbooks” will increasingly become transformed into hypertexts, and become more interactive/embedded in various user scenarios
- ◆ Mobile devices, with embedded personalized AI functionality (akin to Siri assistant in Apple iPhone), will play the role of personal tutors and

As the best way to learn is to teach, we need to design an educational system where everyone has a role to teach others.



YIANNIS LAOURIS,
Chair, Future Worlds Center

⁸⁰ As suggested and prototyped in the work of Metaversity led by Mikhail Kozharinov

FACE-TO-FACE AND FACE-TO-TECH LEARNING

There is a huge number of local, national and global “communities of practice” in all walks of life. There are groups that develop and enhance community-based learning within business context, in particular **Society for Organizational Learning**. Community based and organizational learning is supported by online platforms that enable knowledge sharing and open innovation, such as **Induct Software** and **Invention Machine**.

There are also innumerable instances of “personalized” education technologies. There is a great variety of mobile apps for learning that can be downloaded from AppStore and PlayMarket, but usually they are very fragmented in terms of skills and knowledge they provide, and are very poorly integrated with each other. “Brain-training” apps and platforms such as **Lumosity**, **CogniFit** and **Elevate** offer a variety of short exercises that train various cognitive skills and can be seen as prototypes of more integral

approach towards personalized learning. Experiments on interactive digital textbooks are championed by publisher **Pearson**, in some cases in partnership with personalized learning platform Knewton. There are also many simulators that offer learning experiences within the context of certain subjects, and online universes of **MineCraft** and **Second Live** has been widely used in educational contexts. Among the examples of games that instigate strategic thinking and understanding of variety of economies and societies are **Civilization**, **SimCity**, and **Eve Online**. Wearable devices with learning scenarios are in the early stages of experimenting, and some attempts of integrating biometric wearables such as **Apple Watch** into online and blended learning are underway.

trackers of personal learning progress (based on the current rate of development and ongoing experiments; a cheap and accessible technology of automated teaching within all kinds of disciplines is highly plausible within a decade)

- ◆ Simulators and augmented reality for gamified learning and skill development (including cognitive, social, and physical skills), as well as educational scenarios embedded within virtual gaming universes (such as MineCraft, Second Life, Sims Online, Eve Online, and many more)
- ◆ Wearable devices such as fitness bracelets with enhanced functionality (that include measurement of pulse, temperature, and GSR), and other wearable devices with biofeedback functionality, will be able to train various physical behaviors (i.e. moving or running) and psychophysical behavioral patterns (including self-regulation through breath control and meditation).

The main advantage of technology-intense learning is the promise of making personalized learning available for everyone. Digital pedagogy (enabled by Big Data analysis and Artificial Intelligence) allows gradual customization (later, personalization) of the learning content and processes based on learner’s behavioral patterns and life strategies (incl. career, health, etc.). Personalization can, on one hand, be based on the current skills/knowledge and the purpose of learning, which already provides highly customized

⁸¹ This is visible within language educational applications (e.g. online-based Duolingo platform or English First blended learning platform)

materials for every learner within such platforms⁸¹. Behavioral data obtained even within relatively sensory “sparse” interfaces of digital textbooks allows the identification of cognitive abilities and preferred learning style of a learner. Coupled with data that can be obtained from wearable devices, it allows for the fine-tuning of learning experiences to the state of a learners body and mind. Within 15-20 years, such technologies will allow for the delivery of personalized education to every tech-equipped learner – most likely, the majority of planet’s population.

3.5 The Rise of Integrators

All of the above mentioned educational innovations are now but scattered pieces of a complex puzzle⁸². They will only become an integrated picture of new educational ecosystems when “unifying principles” emerge as a kind of “glue” that connects diverse learning experiences for a variety of learners and learning communities. Existing educational systems have at least two of such “gluing principles”: first of all, the “gluing” is done by educational providers (schools, universities, and colleges) that take responsibility for a long cycle of human learning within a certain age period; second, it is a system of accreditation/qualifications that “glues” different learning institutions together and allows learners to move between stages of education.

In order for new principles to arise, emerging educational ecosystems need to provide the constant tracking and recording of learning outcomes within each “block” of learning programs (and not only during final/qualification exams), and do so in such a way that is universal and transferable (i.e. by tracking learning achievements or level of competencies). Learners then will be able to move between learning spaces in a “seamless” way, all the while advancing one’s learning portfolio/profile (documenting skills, competencies, project results, and recommendations) throughout life. We believe that universally accepted learning portfolios will provide a kind of a “meta-platform” within the next decade – in fact, a lion share of all necessary personal data is already available to leading technology companies (such as Google, Apple, and Facebook...), although currently it is used mostly for marketing purposes.

While questions remain about how personalization may serve to drive learners toward select kinds of information and conclusions based on human biases or AI manipulation, intentional or otherwise global technology companies, as aggregators of personalized online behavioral data, will inevitably play significant roles in future global educational ecosystem creation. This raises issues of privatization, learner privacy, and social engineering on a world scale. Perhaps in collaboration with global tech companies, a “meta-platform” can be created as a consortium between global online learning platforms, which will aggregate standardized learners’ data in order to foster interoperability of these learning platforms (recognizing that any fixed platform will be a hindrance to evolution of the “glocal” ecosystem). Interoperability or a standard meta-platform could boost the personalized learning trajectories of individuals and communities while supporting the development of new online pedagogies that meet the needs of an ever more diverse base of learners. Due to the sensitive nature of learning processes, the importance of education for indi-

⁸² A “fractured” character of MOOCs is discussed by Zemsky (2014), but equal considerations can be applied to many other types of education technologies and “new” learning spaces.

Development of educational ecosystems will continue, and it will also lead to more fragmentation. There is a need for “integrators” of ecosystems that provide new ways of assessing.



CHARLES FADEL,
President of Center for
Curriculum Redesign

vidual and societal advancement, learners' interests must be protected against abuse & manipulation by commerce and governments. To guard against these possible violations, global online learning platforms and global technology companies need to be encouraged adopt the Declaration of Learner Rights in the nearest possible future, establishing that platforms should build on learners' aims, relevant to social and Biospheric functions, increase time and leisure and provide positive feedback and recommendations, as well allow room for disagreement, diversity and open-mindedness.

Furthermore, when we explore education futures as learner-centered and lifelong, we assume that each learner will have a personal learning trajectory that is constantly developed and updated. It is very likely that the majority of learners in the foreseeable future will not be constantly deciding about their next steps in learning – it is much easier for them to develop (or to obtain pre-developed) “packages” of learning experiences that extend over considerable time⁸³.

Until recently, it was traditional educational institutions, schools and universities, that played such a role by assembling the variety of learning environments under the same brand: experts with deep professional knowledge, laboratories, training grounds, etc. However, as the landscape of education becomes more complex, variety and diversity increases and education becomes “unbundled”. For instance, a certain professional skill of working with specific equipment (i.e. welding) can be obtained in a college, in a stand-alone fab lab, or within an augmented reality simulator that can be used even at home. As new diversified spaces of different educational providers arise, and “meta-platforms” become proliferated, there will emerge an increasing demand for unique educational journeys over long periods of time (months, years, and decades) – in other words, personalized educational programs.

When we look from the perspective of end-user, we see that in the new (network-based) sectors of economy, product ecosystems are built around “integrators” that serve as “entry point” to end users⁸⁴: i.e. Google in searching, Facebook in social media, AppStore in smartphone applications, etc. In “new” education, such integrators must become long-term providers of personalized learning trajectories that can evolve over time.

Various “new” players can help integrate learning experiences into long trajectories with learners and self-guided life-long co-designers. We see at least four types of such players that are, or may become, significantly interested in integrating “long” learning journeys with products that they provide:

- ◆ Game and toy developer's creations are considered a type of leisure that competes with “useful” activities such as education. Game developers (such as Blizzard), game console producers (such as Microsoft and Sony), and toy

⁸³ See general discussion of this principle, the principle of “least effort” in human behavior, in the work of George Zipf [1949] Also, see discussion of limited application of more complex interfaces in the essay on Doug Engelbart's “violin”: <http://www.loper-os.org/?p=861>

Edtech is currently created by linear thinking people. We need more multi-discipline platforms.



GEORGETTE YAKMAN,
Founder of STEAM Education

⁸⁴ See more detailed discussion in the text by James Moore who originated the “business ecosystem” concept: http://antitrustinstitute.org/files/Business%20ecosystems%20and%20the%20view%20from%20the%20firm,%20antitrust%20bu_081320081450.pdf

companies (such as LEGO) can legitimize their growing access to children and adult's play time by providing videogames, game universes and robotic toys that have educational components and real-world application

- ◆ Massive online course platforms (such as EdX, Udacity, Coursera, Khan Academy) are disrupting the full-scale educational market by "repackaging" academic and vocational knowledge into online content championed by top universities and major training companies. Educational platforms have started to move along these lines: e.g. EdX provides MicroMasters degree, while Khan Academy provides series of courses that concur with school education in math and science.
- ◆ Career management platforms partnered with existing professional social media (such as LinkedIn) and job search platforms (e.g. Monster.com) in the future may evolve into full-scale career management connectors of career trajectories with personalized education. They may also offer support to companies that want to invest in talent (in the same way that investment into sport and art talents are currently being made). In this case, trajectories of personalized education and training will serve to manage career opportunities and income streams
- ◆ Mainstream social media (such as Facebook or Twitter) will start adding learning opportunities as a part of their personalized filtered "news feeds"; while learning remains outside of the scope of social media, it may become part of offerings in the future

Future educational ecosystems will likely model the design of other network-based industries: in this case, ecosystems will be clustered around integrators that coordinate their supplier systems, organized into tiers. Various types of educational providers and educational technology developers will need to define their role in relation to future integrators (Figure 9).



Figure 9: Organization of learning ecosystems from the perspective of product integration

3.6 Catalysts For Change: A New Role for Schools and Universities

With the transformative emergence of new domains of learning quickly approaching, what will be the role of existing educational systems in the future? Will systems dissipate, as some radical innovators suggest, to be replaced by the multitude of novel formats? Will most learning move into online spaces, and will campuses be gradually vacated? Will, as some visionaries anticipate, systems remain and get even stronger, becoming one of the “pillars” of national economies and job-creating sectors, especially when robotics and artificial intelligence replace humans in industry-related jobs fostering a renaissance of human creativity and learning?

The answer to these questions is dependent on the ability of existing school and university systems to evolve beyond existing models, and escape the institutional “iron cage”⁸⁵ of (often very rigid and past-informed) expectations set out by governments, employers, parents, and other stakeholders, as well as by teachers and administrators themselves. These expectations force schools and universities to remain within the existing designs, and so “school freedom” alone does not allow the system to evolve significantly, unless a purposeful and concerted action of educational innovators and policy makers makes this transition more efficient and directed – but of course, first of all, a direction for intentional evolution needs to be set.

The deficiencies of existing educational systems are widely known. Critics argue that models lack ability to nurture independent learners, that they destroy natural human curiosity and creativity, and remain rigid and unable to cope with the dynamic and changing demands of the 21st century [Robinson, Aronica, 2015]. Furthermore, some more radical critics argue that the “schooling” model of education itself is faulty by design, and that it stands in the way of next generation of “learner-oriented” learning spaces that demand ultimate “deschooling” [Illich, 1976]. Proponents indicate that, despite these pitfalls, the system has been capable of producing robust and replicable results. It served well the needs of industries and nations, it prepared qualified workers and loyal citizens *en masse* – and it still does this job, as the massive demand for secondary and tertiary education continues to grow. And so, as the saying goes, “if it ain’t broke, don’t fix it”.

Instead of siding with one of these viewpoints, let us seek a consensual view. Often collective energy and attention of educational innovators and policy makers is focused toward the transformation of educational models through the transformation of schools and universities. If schools and universities are anticipated to remain *the dominant* providers of learning experiences in the next decades, then it is highly realistic that an emergent educational

⁸⁵ The concept of “iron cage” [DiMaggio, Powell 1983] suggests that variety of organizations within a sector will over time converge to some “standard” forms in their field because of the variety of social factors: coercive (legislation, regulation, and stakeholder expectations), mimetic (copying of organizations that are already successful), and normative (employing professionals with similar values & norms).

landscape will be constantly lagging behind the rapidly changing realities of economies and societies of the world. But if we focus on the conditions that give rise to lifelong educational ecosystems, then schools and universities can evolve into “educational hubs” that host multi-generational learning ecosystems that will grow and evolve within, around, and between them.

The inflexible, centralized, hierarchy-based governance of classes, educational institutions, and regional/national educational systems, need to be replaced by governance models built on principles of self-organization, evolution, and net-centricity. Increased variation in methodologies and content of education needs to be coupled with efficient mechanisms of selection, or feedback loops, that create stable processes of evolutionary selection of programs that best fit individual and collective learner needs over time. In other words, educational institutions will only be able to catch up with the growing complexity and accelerated change of the world around them, if they develop capacities for constant evolving and upgrading – also known as “self-guided evolution”. As local and global educational ecosystems emerge to serve the great variety of learner needs, services and experiences within these ecosystems can already be begun to be prototyped within educational institutions that are prepared to become educational hubs of the future. The development of educational hubs is a natural transformation of schools and universities, because:

- ◆ They already have *specialized* spaces suitable for various types of *individual and collective learning* activities (classrooms, halls, yards), as well as specialized training equipment (laboratories, sport facilities, etc.), and can host a large variety of learning activities and practices
- ◆ They already are the *nexus of different communities, groups and individuals* that have a diversity of skills and knowledge to share, as well as various learning interests – and so they can connect these interested parties for mutual learning and teaching opportunities
- ◆ They are socially recognized as safe havens or *containers* where various types of *learning and social experimenting* can take place, with no or little penalty on failures – and so they can become *laboratories of the future*, where social innovations are safely prototyped.

In order for schools & universities to become educational hubs there is a need to:

- ◆ “Open up” to learners beyond their standard cohorts, i.e. all ages and all kinds of lifelong learners

Don't be fooled by the fact that a few people like Mark Zuckerberg don't get a college degree. They've already had the equivalent of a college degree by being educated at the elite private school. Only a very small number of students today can afford to drop out.



HENRY ETZKOWITZ,
President, Triple Helix
Association

- ◆ Become sufficiently flexible to provide learning *experiences of various durations* (from very short, hours or even minutes, to very long, that last many years), various intensity (from extremely high, i.e. live action role playing games, to low intensity, i.e. contemplative meditation), and various learning styles (cooperative and competitive, cognitive and emotional, participatory and observational, practice- and theory-oriented, etc.)
- ◆ Provide opportunities to *multiple independent providers* that can deliver the variety of learning experiences to the variety of learners, and that can create more complex educational products through exchange and collaboration.

Although a transformation of this nature may seem easier said than done, a fully functioning educational ecosystem is one that caters to variety of individual and collective learning needs of self-guided learners, such that the “seeds” of educational ecosystems can be based upon a set of principles that emerge through the process of prototyping the ecosystems and serves as a response to the natural shifting of educational landscape. The transition, therefore, can begin with the increasing shifting of decision-making to students, recognizing the value of student’s voices and choices. Recognition of student voices (and shift of decision making to students) is one of the main transformational challenges for secondary and tertiary (and even primary) education, to which many administrators, teachers, families, and even sometimes students themselves often resist. The gradual introduction of student-led learning opportunities is, however, inevitable – since we can become learners for life only through the regular practice of self-guided learning (and the skill of lifelong learning becomes crucial to cope with 21 century challenges). Learning methodologies driven by student’s own interests and choices, such as project-based learning and game- and play-based learning, as we have already discussed, are among one of the highly efficient tools to “initiate” students into self-guided learning⁸⁶ – and so it will be increasingly applied across all levels of education (see discussion in Section 2.2A).

Self-guided learning is also encouraged by game-based and, increasingly, play-based learning. Unlike gamification which only adds elements of the game to existing schooling process to make it more fun – playification revolves learning experience and makes it play-centered. By taking roles and living through various situations of life (and sometimes situations that are very unusual and even unnatural), students expand their experiences beyond their limitations and obtain practical insights. Playification (as distin-

There is a need of strong leadership from teachers, to help awaken kids’ identity and motivation for learning. Teachers encourage children to become a better person, and therefore they should lead with wisdom.



YUHYUN PARK,
Founder, Infollution Zero

⁸⁶ In particular, in higher education for engineers and technology specialists, project- and practice-oriented standard of CDIO (conceive – design – implement – operate) has proven to be among the most productive. See <http://www.cdio.org/> for details

guished from gamification) becomes increasingly important in getting skills of the future as it allows “living through” studied topics instead of learning about them (story-dwelling, not only storytelling).

In 21st century education the limited focus of industrial-based education on the development of cognitive abilities and professional skills will be seen as highly deficient. Instead, a call is being made to develop “humane” abilities, including emotional and social intelligence, creativity, and skills that support collaborative work. Such learning processes open up to new dimensions and allow the development of a “whole person”⁸⁷ that learns with “the heart” (emotional and social aspects of learning) and with “the gut” (anticipatory, intuitive, sensing and body-oriented processes) as much as with “the mind”. This process will be enhanced by the increased recognition of the irrelevance of standardized learning achievement measurement (including tests of cognitive abilities), and the need for more “holistic” assessment metrics that embed various aspects of mental, physical, and emotional development. Whole person education recognizes qualities neglected in traditional Westernized education, including the support to the practice of vulnerability (which promotes openness and sincerity within society) and recognition/empowerment of the feminine within each of us. In lifelong education, a gradual shift of pedagogical focus will occur from skills to meta-skills (i.e. thinking methods, creativity etc.) and from meta-skills towards existential skills (that determine our long-term “strategies of living our lives”). Within 15-20 years, some of existential skills may become a focus of standard curriculum in developed countries.

Educational institutions can increasingly become hosts of learning communities; horizontal/network-structured learning communities can play increasingly important roles in learning, offering programs and curriculum more relevant to student needs. Part of their role for learners is to “unschool” themselves, to remove negative programming created by industrial education. Learning communities can offer education centered on students’ interests and real-world problems (i.e. topic-based education instead of subject-based). “Unstructuring” of existing schools can be part of this process. Learning communities can be created with a cause (i.e. focused on social activism or specific needs of a local community), and thus collaborative action can guide collective learning. While some of this learning may happen face-to-face, it may also be conducted in peer-to-peer online networks. In addition to peer-to-peer learning, P2P mentoring will be an important part of future learning landscapes.

It’s urgent that school becomes a real positive social force for human development.



CLAUDIO NARANJO,
Psychiatrist, founder of SAT
Institute

Unless we reinvent the school and avoid leaning towards as individuated tech-driven solutions, the social deviances will get even bigger than they are already.



VALERIE HANNON,
Director, Innovation Unit, and
co-founder, GELP

⁸⁷ See Whole Child Education initiative championed by ASCD: <http://www.wholechildeducation.org/>

In order to become hosting spaces for a wide variety of learning styles and approaches, educational institution leaders need to let go of the current tightly held concept that education systems are the sole providers for learning outcomes. Instead, they are the ones that create the conditions of learning. New “metrics of success” are essential in such environments: i.e. density and variety of learning experiences (and parties that provide them), diversity of learning trajectories, richness of artifacts produced by learning communities, etc. Instead of making themselves into an image of operators of a well-oiled social machine of education, educational administrators can make themselves into an image of gardeners and foresters who watch over a garden of learning, responsible to cultivate the best possible conditions for lifelong learning.

Furthermore, educational hubs, schools and universities have the opportunity to become laboratories for societal transformation – or, they can become challenge-driven⁸⁸. The ongoing transformation of education is an opportunity to fulfil the century old vision of John Dewey, who said, “Education is the fundamental method of social progress and reform”. Our civilization is in the midst of a major transition, learning to cope with challenges of living in a technology-saturated, opportunity-rich, complex and dynamic world, which also requires us to find solutions for global risks and existential challenges. To craft new ways of living that are better, healthier, happier, more collaborative, and more productive – is a task beyond a capacity of any one institution or group of individuals. The decentralized and evolutionary governance of educational hubs may also serve as part of the solution supporting the transition of our society toward learner-engaged co-creation of abundant and thriving eco-social futures.

Accordingly, schools and universities can fulfil several roles that are instrumental to such a societal transformation:

- ◆ First of all, they can become the *re-integrators of community life*, especially in smaller cities and rural areas, offering opportunities for professional, hobbyist, multi-generational and family-based learning (in particular, they can host labs that seek to find new ways of communal family living)
- ◆ They can become *centers of society/community-oriented work*, including volunteer and civil work, co-created “democratic” art, reconnection with minority and socially underrepresented/unrecognized groups, and more...

Education is about producing good effective world-improving people. Ultimately its goal is not to improve individuals – the end of education is to improve the world.



MARC PRENSKY,
Founder of Global Future
Education Institute

⁸⁸ https://www.nesta.org.uk/sites/default/files/the_challenge-driven_university.pdf

- ◆ And, they can become *spaces where “future is produced”* – not only in the sense that they host groups producing new knowledge and technologies (as has been the case of universities for a very long time), but also become labs of social innovation, including new ways of living, new models of economy, new approaches to governance acts.

All of these transformations bring schools and universities into the new role of “community of communities” (see more detailed scheme for universities in Figure 10), which exists at the nexus of student communities and various outside communities (professional, social, artistic, urban, etc.), with a school / university serving as a holder of creative space and a facilitator of collective learning, co-creation and innovation processes.

It is therefore natural that schools and universities “open up” and support learners to gain a variety of practical experiences in the world, allowing them to return, process, and integrate their knowledge, individually and in collaboration. By opening up to the needs and processes of society, educational institutions can become “hubs” that both concentrate on learning trajectories, experiences, and communities and the transformation of society at large. In particular, they can also become the vehicle for introducing new and innovative ways of living and becoming the “heart of the smart city” [Vander Ark, 2014] and a “smart” (later, wisdom-based) society in general, fostering reintegration, and encouraging “glocal” learning ecosystems.

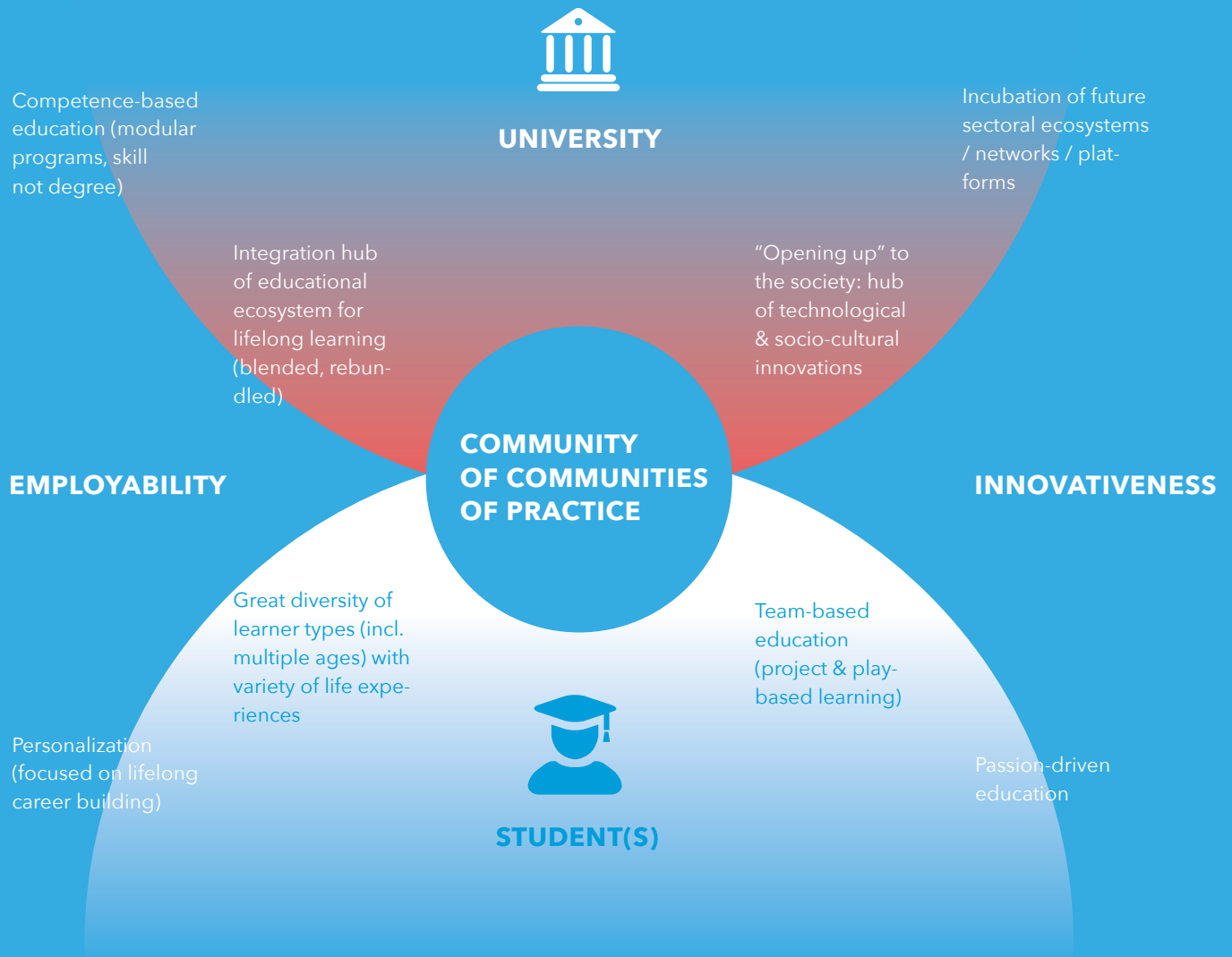


Figure 10: New role of universities as "community of communities"

4

EDUCATION FOR INTENTIONAL EVOLUTION & THRIVABLE FUTURES

We are at the very beginning of time for the human race. It is not unreasonable that we grapple with problems. But there are tens of thousands of years in the future. Our responsibility is to do what we can, learn what we can, improve the solutions, and pass them on.

RICHARD FEYNMAN

4.1 Transformative Education

The previous sections of this document outline many inherent challenges within our industrial civilization and offer possible adaptations humanity can enact through the transformative power of education. In the face of increasing complexity, we collectively have the opportunity to become increasingly proactive and intentionally develop new collective competencies and learning ecosystems that support our civilization to become aligned and congruent with the challenges and opportunities of the emerging future.

However, as we continue to design the new dynamics of our educational institutions and systems, it is important to ask ourselves: to what extent are we satisfied with the models of civilization that we are creating and perpetuating through our educational pathways? Do we indeed believe, for instance, that the task of educators is to prepare learners for the next industrial revolution that will perpetuate destructive environmental, social, and economic practices around our planet? Or, perhaps may we choose to shift the purpose of education toward the exploration, understanding, and stewardship of the biosphere in which we live and on which we depend? The latter invites an understanding of the “boundary conditions” of our planet, a creative transformation of our human systems, and the intentional evolution of humankind.

The first of such boundary conditions then is the relationship with our natural environment. Of the list of top risks outlined by the World Economic Forum for the next decade, at least 50% of them are related to increased disequilibrium between our society and nature: extreme weather events, climate change, mitigation failures, water crises, natural and manmade disasters⁸⁹. The World Wildlife Fund report outlines a highly probable 2/3 decline of wildlife populations between 1970 and 2020⁹⁰, which may consequentially lead to a comparable loss in biodiversity and resilience of the biosphere. The continuation of industrial pollution of air, water, and soil disrupts self-regulation systems of the Earth and challenges planetary boundaries within which the humanity may continue to operate safely⁹¹. Although humanity is awakening to the devastating impact we are having on our biosphere and the planet as a whole, this issue remains marginalized in political and social discussions. And though environmental protection has become a mantra, as has corporate social responsibility, our civilization largely continues practices that reduce our chances of survival on Earth. While most people remain enchanted with a notion of personal, organizational, or national success, our societies keep forgetting that, in the words of Donella Meadows [2001], “no part of the human race is separate either from other human beings or from the global ecosystem”, and so it is impossible “for the global economy to succeed if the global environment fails”.

⁸⁹ See http://www3.weforum.org/docs/GRR17_Report_web.pdf

⁹⁰ http://awsassets.panda.org/downloads/lpr_living_planet_report_2016.pdf

⁹¹ <http://www.stockholmresilience.org/download/18.8615c78125078c8d3380002197/ES-2009-3180.pdf>

Yet among the most impactful and immediate threats our species faces, the top one is the risk of use of weapons of mass destruction (WMDs). Although arsenals of nuclear arms and other WMDs (biological, chemical etc.) have been significantly reduced since the end of Cold War era, the potential use of such arms (especially those in the possession of the US and Russia) is still capable of destroying nearly all of the life on Earth. With the increasingly populist politics across the world driven by fundamental “cultural backlash” [Inglehart, Norris, 2016], as well as the use of automated warfare, the probability of a miscalculated violent conflict increases could eventually lead to the deployment of WMDs – escalating local military incident into a global mutually destructive war within days if not hours. Additionally, weapons of mass destruction or the technologies that produce WMDs is becoming increasingly accessible to small terrorist groups. With multiple global threats increasing, it is estimated that the probability of the human civilization to collapse before the end of the 21st century is around 50% [Rees, 2003], and the possibility of humankind disappearing altogether is between 20% and 30%⁹².

The cumulative nature of global risks has been widely discussed in Nassim Taleb’s “Antifragility”. Taleb [2012] suggests (and we concur with his view) that it is not possible to prevent the accumulation of global risks within the increasingly complex society by creating better systems of command and control. The only way to make global civilization not only less fragile, but crush-prone or “antifragile” is by creating the capacity to absorb risks at their source: the level of personal action. In other words, it requires every citizen of the global world to take care of the globe, including negative impacts on nature and potential destructive conflicts within our society. Therefore, the main role in global risk prevention should be attributed to individual and collective competencies that foster local, national, and global wellbeing.

The role of education as a transformative power has been often downplayed, and it was seen as a vehicle driven by the needs of the national government and economy. However, education holds the potential to be much more; not only can it serve the current and emerging demands of our society, it can also become a method for the transformation of our society, an enabler of the potential of humanity and a way of restoring its balance with Earth planetary systems.

Before us are choices: will educational systems of the future focus only on serving existing economic, social, and political agendas (such as closing the skills gap or improving the national competitiveness)? Or will educational ecosystems develop new opportunities for collective living and being such as sharing and regenerative economies and other solutions for beneficial human endeavor? Will we foster capacities of learners to collaboratively address the

If the world is more fragile than ever, the growth of consciousness has to be an important value even if one sees the depth and breadth of unconsciousness.



RALPH WOLFF,
Founder, Quality Assurance
Commons

We need graduates with humanistic values for the unknown future.



YIANNIS LAOURIS,
Chair, Future Worlds Center

⁹² <http://www.nickbostrom.com/papers/future.pdf>

fundamental challenges of the current civilizational models, and help conduct a civilizational transformation toward a sustainable planetary civilization?

We indeed can include a variety of responses to such questions; in fact, the “higher” levels of societal, economic and cultural shifts would include the “lower” levels of societal transformation (Figure 11). As an enabler of such transformation, education can become a “cradle” for new civilizational models, a “sandbox” where new ways of living, working, playing, and creating are collectively tested and distributed.

As outlined throughout this exploration, the main challenge/opportunity facing our society is to move toward a “wisdom-based society”, a society unified by collective wisdom that helps us navigate together through increasingly complex dynamics. Such a transition, as we will argue in the next sections, is possible and needed on both an individual and a collective scale; and education can be a source of societal transformation addressing global challenges through the co-creation of civilization wide solutions.

Education is the key to the new concept of global security.



FEDERICO MAYOR ZARAGOZA, Chairman, Foundation for a Culture of Peace, and former Director-General of UNESCO (1987-1999)

‘CIVILIZATIONAL TRANSIT’:

focusing on emerging social practices that help us recognize ourselves as a truly planetary species (e.g. Macy’s Great Turning, Eisenstein’s More Beautiful World etc.)

Key discussions: how can education help us reinvent our relationship between ourselves, with our ancestors / descendants, and with our planet

‘REBUILDING URBAN CIVILIZATION’:

focusing on life quality & social impact (e.g. Sharing Economy, Scharmer’s Capitalism 4.0, Florida’s ‘Reinventing Cities’ etc.)

Key discussions: new models of education that should complement existing ones (e.g. urban learning communities)

‘MORE OF THE SAME’:

increasing economic efficiency / productivity / competitiveness in 21 century

Key discussions: education is broken but could be fixed by introducing better pedagogies / ed tech and new curriculum

Figure 11: Framing of educational redesign

4.2 Evolutionary Challenges of Societal Transformation

As we move into a future of immense opportunities created by our accumulated knowledge and our increasing command over the material world through various technologies, we are faced with the interrelated repercussions of our global influence as a species. The industrial society which has enabled the dominance of humanity on our planet has in many regards vastly improved the human condition including the eradication of famine on a mass scale, provided basic needs to a majority of populations, and so forth – yet the by-product (or the externality) of developed industrial society includes growing social inequality, the destruction of heritage and indigenous cultures, the over-exploitation of our biosphere, the unbalanced use of non-renewable resources, and the destruction of ecologies and biodiversity loss at a mass scale, etc. We are contributing to major global risks threatening the well-being and survival of humanity and the biosphere as we know it. The root cause of this existential crisis' of our times arises from within ourselves: our (innate) preferences and abilities, our choices and actions, our cognitive constraints and biases, and resulting cultures and technologies that we produce. We are in the age of Anthropocene, when human actions already create visible impact on all planetary systems, yet we do not have sensory organs that allow us to immediately perceive the damage we create to our planet, and our mind does not allow us to foresee the long term environmental consequences of our actions. Our decision making processes are oriented at short-term individualistic gains – and so are the decision-making processes of populist politicians that can one day bring major nations into a deadly military conflict with a risk of eradicating our civilization. Some liken humanity to “a monkey with a hand grenade”, a creature that can eventually destroy itself by making an irresponsible and fatal decision.

It is very probable that things will only get more difficult. Coming decades will be characterized by radically increasing complexity (largely driven by accelerated digital technologies and their convergence with biotech, nanotech, robotics etc.) – and there are few if any major socio-ecological-technical-educational endeavors that aim to address the new dynamics that will arise from such changes. Moreover, there is an increasing gap between the complexity of socio-technical environments and the mindsets and tools that are used to understand them and to direct them. In particular, the growing tension between increasingly complex knowledge organization (required to help guide complex societies) and barriers to complexity comprehension will be a key challenge of knowledge and management work in 21st century; thus,

The main mission of education in the 21st century is to hone one's skills of interacting with complexity.



ALEXANDER ASMOLOV,
CEO, Russian Federal Institute
of Education Development

the over-simplification of knowledge becomes a great risk. It is necessary to seek methods that help deal with this issue, by being willing to embrace complexity, and also by developing new ways of sharing and developing shared understanding.

Furthermore, the continuing growth of socio-technical complexity, coupled with the unfolding global environmental crisis, will call for further evolution of knowledge creation and management systems that guide our local, national and global societies. The genie is out of the bottle: our social systems have largely come out of balance with the natural world during the centuries of the industrial age, and there is no way to return to “good old” pre-industrial practices (through deindustrialization or deurbanization, or returning to social practices prescribed by ancient religious traditions) without destroying the foundation of our civilization. The collapse of our complex civilization, although highly plausible⁹³, would have tremendous impact on the size and complexity of our human influence. If we fall back on the level of productivity that existed at the beginning of industrial revolution era, our whole planet will be able to feed between 1.5 and 3 billion people⁹⁴, and if we move to the “natural” pre-agrarian way of nomadic hunter and gatherer living in forests and savannahs, the maximum number of inhabitants on the planet will not be able to exceed 300-350 million people⁹⁵. In other words, keeping the existing (and increasing) size and complexity of the human civilization is absolutely contingent upon our transition toward a higher level of collective organization and creation of “complexity management” practices – and not simply becoming more “natural”, less “industrial”, more “decentralized”, or more “traditional”⁹⁶.

The only way to go from here is onward; to evolve our ways of thinking, learning, and acting together in such a way that is coherent with the dynamic flux of our increasingly complex world. The relationship between the biosphere and role of the technosphere within it must be rethought; our technology needs to be reintegrated with other planetary systems. The trajectory is to shift from technical to socio-technical systems design, and from there toward natural-socio-technical systems that allow will real-time coordination of human and natural systems of our living planet. The design and management of complex societies will include coevolutionary development of both techno-sphere and organic “components”: cities, regions, transportation systems, natural and regenerated territories, that leverage the power of natural biotic regulation by “bringing forests into cities” and creating symbiotic natural ecosystems with artificial components (but under control of living, and not machinery, beings!) – recognizing that the complexity of natural organic systems surpasses anything that our civilization is able to create in the foreseeable future⁹⁷.

Big data / machine learning (and, potentially, technologies of artificial intelligence) can increasingly become “partners” in this process of ecosystemic regulation. In particular, in the world of exponentially growing data

Our civilization should not try to remove uncertainty – but to develop capacity to manage higher levels of complexity and uncertainty.



ROBERTO POLI,
UNESCO Chair in Anticipatory
Systems

⁹³ See profound explanation of factors that drive collapse of complex societies – most often due to destruction of environments supporting these societies and imbalances within societies themselves [Tainter, 1988]

⁹⁴ See extended discussion of this question here: <https://www.quora.com/Could-7-billion-people-live-on-Earth-with-pre-industrial-technology>

⁹⁵ According to calculations made by Akop Nazaretyan [2015]

⁹⁶ And this calculation indicates why the project of human “rewilding” [Olsen, 2012], going back to the pre-civilizational state, while appealing, will not be plausible

⁹⁷ See <http://www.bioticregulation.ru/> for exploration of this pathway

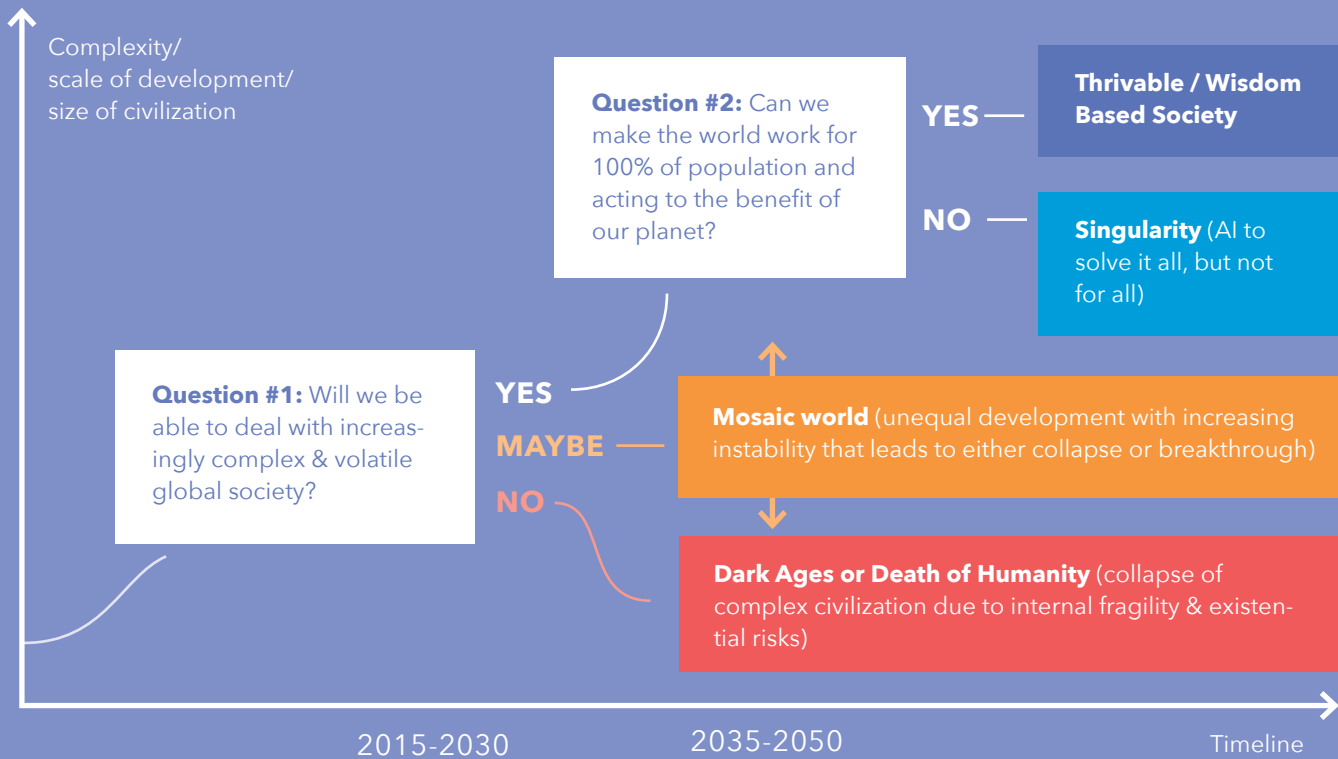


Figure 12: Key “bottlenecks” of the civilizational transit

and accumulated scientific knowledge, artificial intelligence can increasingly play a role of knowledge integration and collective decision-making facilitation. In such an information rich world, where many traditional human roles can be gradually replaced by robotics and algorithms, the need for new ways of “knowing” and “managing” will increase. Accordingly, a key barrier on the pathway of societal transformation is the ability to design and maintain new evolving systems of knowledge creation and management that are able to cope with, and adapt to, growing complexity as it increases⁹⁸.

Despite the increased understanding of accelerated global civilizational crises, our societies prefer to operate under the assumption that the world will largely remain as it is, and that global societal evolution will be accomplished through incremental adaptations. However we must understand the price that will be paid if a transformation of our civilization does not occur. Even faced with societal life and death choices humanity does not and is not likely to have a single authority that coordinates international and national development of technological, ecological, or cultural policies. An attempt to retain the existing system of norms and social institutions despite the continuing growth of technological complexity will create the increasing instability, will accumu-

⁹⁸ In particular, one question that arises is how such systems would cope with a growing accessibility of potentially globally lethal technologies such as biotechnologies and nanotechnologies? Will we see the emergence of responses to complexity driven by control where freedoms of research and exploration will softly but steadily be removed from us – or will it be possible to find ways to include diverse potentially aggressive groups into collective social evolution, by converting their destructive intentions into constructive efforts?

late global existential risks, and therefore most likely lead to one of the most negative scenarios of civilizational collapse or even the death of a humankind – e.g. if one of the possible lethal technologies controlled by autonomous artificial intelligence is deployed during an unfolding international conflict. However, there is also no turning back to simpler ways of living that existed even a century ago: we are fully dependent on global divisions of labor, and any complex product that is used by a significant share of the world’s population, from mobile phones to food, requires massive industrial and technological collaboration of organizations that spread across nearly all continents of the world. And, as we discussed, the cost of simplifying our global society, whether purposefully or spontaneously, can be horrifying.

If we are to respond well to increasing complexity and move across the “complexity barrier”, there are two key approaches that may help us to achieve this. The first one could tentatively be called a technology-driven “singularity solution”⁹⁹ which implies that application of disruptive and exponentially developing technologies may solve our problems, even if they are not massively understood or supported by the general public. In particular, this techno-optimistic approach advocates that a self-improving Artificial Intelligence will emerge from current machine learning experiments to help manage the constantly increasing complexity. The big idea of this approach is to achieve the breakthrough for a small group of technological elites that will gradually become a super-humanity, or transhumans. In the more extreme version, it is suggested that technologies will liberate transhumanity from constraints of the planet, and so planetary boundaries should not be a concern of technological progress at all¹⁰⁰, and in case the nature-humanity balance is already non-restorable, we will simply use more technologies to survive¹⁰¹. Also, it is widely discussed that society will be increasingly unequal and greatly polarized, and new social hierarchies will be defined by the personal and collective abilities to produce or use technologies of “taming complexity” (and that this inequality is a fair price to pay for the continuation of our society)¹⁰².

The future alternatives for regulators, investors, and technological and social innovators are often framed as a dilemma: leave the things as they are, trying to cope with the growing instability produced by technological and environmental dynamics, and risk a decline or a destruction of humanity – or move towards a “singularity scenario” in which technological progress will *hopefully* solve the problems of humanity, and risk leaving the majority of the population behind “the barrier of transition”, an inevitable yet necessary contingency of this evolutionary leap.

It’s a race between ourselves and technosphere.



CHARLES FADEL,
President of Center for
Curriculum Redesign

We should not be competing with technologies; we should be working with and caring for technologies, getting better at the things that technologies are not good at, and then working with technologies where they are better than us, but entirely to create a better world from moment to moment to every single human.



ROSS HALL,
Director of Education, Ashoka
Foundation

⁹⁹ Often the work of Ray Kurzweil (2005) is cited as one of main inspirations for this worldview

However, we believe that this dilemma of choosing the “lesser evil” is a false one, because a third “good” option presents itself. This main idea is that the “complexity barrier” can and should only be crossed as a *collective breakthrough* of a critical mass of the human population that will learn and create new ways of proactive co-evolution within the eco-socio-techno-sphere (and, in fact, transiting this barrier only by few “chosen ones” will present a great risk for the humankind). The main precondition of this scenario is that such a society would be, in the words of Buckminster Fuller, “making the world work, for 100 percent of humanity, in the shortest possible time, through spontaneous cooperation, without ecological offense or the disadvantage of anyone”. We call this scenario the “Wisdom-Based Society” (as it will only occur through cultivation of collective wisdom) or the “Thrivability” scenario (achieving the state of “thriving” or “flourishing” for everyone and the biosphere as a whole). This latter “Wisdom-based/Thrivability” scenario implies engaging the majority of humankind in a “revolution of consciousness”. Technological advancement is absolutely necessary, but it remains secondary to the development of individual and collective potential. The main risk that this scenario aims to prevent – and the one dominant in “singularity” scenario – is the “dehumanization” of people whereby the majority of our society relies more on digitized protocols, processes, and structures, than on our collective ability and our humanistic drive to evolve.

See Figure 11 for the outline of four dominant scenarios, including possible time frames. We estimate that the “complexity management” challenge has already been presented to the humanity, and it will have to be resolved in next 15-20 years – defining whether we move into a more complex society, or towards the collapse of our civilization. The question of the dominant scenario of transition to complex society – whether it will be a “Singularity” or “Thrivability” option – will become more pressing in the second quarter of 21st century, in case we are able to avoid global catastrophic scenarios. Before the middle of the 21st century, the fate of the humanity will most likely already be decided – it will become clear if we are able to pass through the “bottleneck” of the evolutionary crisis, and what will be the dominant model of our future. Choices that define this future for us, our children, and our descendants, are made right now.

Accordingly, one aspect of the scenario that “works for 100% of humanity” would be creating a means by which to include everyone in this process, overcoming differences in instrumental values for the sake of shared foundational values, or by creating new social protocols that help maintain collaboration and co-creation on various scales, ranging from small groups to nations, to the planet as a whole. In this scenario, the cultivation of collective wisdom becomes an organic, natural process of co-development of human communities at various scale sharing the accumulated commons of humanity. And so, in words of Joanna Macy, it is therefore necessary for many if not all members of the world’s human population to develop “concern for the whole of humanity,

¹⁰⁰ http://www.huffingtonpost.com/zoltan-istvan/some-future-ists-arent-worried_b_4786325.html

¹⁰¹ <http://gizmodo.com/this-planet-can-easily-feed-our-existing-population-th-1721992616>

¹⁰² For instance, see this discussion on “above API (application programming interface)” vs. “below API” jobs and future possible polarization of societies: <https://www.forbes.com/sites/anthonykosner/2015/02/04/google-cabs-and-uber-bots-will-challenge-jobs-below-the-api/#bf-fa3d869cc7>

We may be witness the death of civilization as we know it – and that is our best hope for rebirth.



CLAUDIO NARANJO,
Psychiatrist, founder of SAT
Institute

not just their own community or nation”, and, through education and training, to overcome narrow-mindedness and self-centered thinking that often dominates present cultures [Macy, Brown, 2014].

Another aspect, that is no less important, is the cultivation of “Thrivability”, a new way of interacting between humans and “living” nature-humans living in “Thrivability” within the biosphere (Russell, 2013). The concept of “thrivability” is a next step after sustainability and resilience is achieved within systems and communities. While sustainability implies “minimizing harm” to the natural environment while continuing the processes (so that resources remain and the environment is not exceedingly polluted), and “resilience” implies that sustainability is achieved under the variety of conditions beyond “normal” ones, i.e. the system is able to withstand various shocks – the idea of “thrivability” implies that social systems (human individuals and communities included) can achieve their maximal potential and productivity (while also holding conditions for “sustainability” and “resilience”). Thrivability includes, but is not limited to, “the synergy of life and work and family and love and friends and happiness and relationships and learning”, “living toward our individual and collective potentials and the possibility of all life becoming together into infinity with beauty, grace and style in the here and now” (Cubista, 2016), “bringing awareness to what it means to be alive in psychological, biological, cultural and systemic dimensions”, and “leading flourishing, full life, while acting respectful to your environment through non-destructive non-violent relationships or the ones that embed restoration”¹⁰⁴.

In other words, thrivability implies finding a new equilibrium between individual and collective being and becoming within and beyond the biosphere. It is widely speculated that the accelerated technological changes (especially if accomplished in the interests of majority of world’s population) have the potential over the next century to bring us into a “society of abundance” or “post-scarce society” [Diamandis, Kotler, 2012]. However, the experience of abundance comes not only, and not so much, through the satisfaction of physical and emotional “needs” (that often do not reflect basic necessities of human being but are socially constructed through the media and advertising industry) – but by recognizing, and serving, more fundamental needs of love, connection, creativity, and spiritual development. For such a societal transformation to occur there must be a creative renaissance in our ways of learning, organizing, and collaborating, an intentional evolutionary process to meet the needs and possibilities of our future. And education, as a collective transformative human practice, opens up opportunities to unite our individual drive for self-actualization with our collective potential to collaborate at scale through wise action for the mutual benefit of ourselves and our biotic community.

One of the most important roles of education right now is to help humans become re-enchanted with life itself, to begin really appreciating, participating within and reciprocating with living systems



DAVID MCCONVILLE,
Co-director, Buckminster
Fuller Institute

Reuse is the main tool to get a better balance between nature and cities, and better use of space in dense cities.



CEES DONKERS,
CEO QASE, former City
Urbanist Eindhoven

¹⁰³ <https://www.bfi.org/about-fuller/big-ideas/world-game>

¹⁰⁴ These are participants’ statements from the sessions of Global Education Futures & Protopia Labs Futuriser gathering on “Education for Thrivability” (Cyprus, Septembers 2016)

4.3 Practices for the Emerging Future

As our society and world becomes increasingly complex, moving toward a thrivable and wisdom-based society is the optimal (and achievable) scenario. By developing educational ecosystems that foster the cultivation and widespread practice of capacities that contribute to a thrivable society, we increase the probability of realizing such a scenario. Based upon the assumption that we are indeed in the midst of increasing times of societal flux and that we are tasked with the choice and action toward desirable futures there is a need to create new social attractors that support thrivable futures and a wisdom-based society. Co-articulating a compelling vision of the future that integrates educational ecosystems as laboratories for societal transformation and prototyping innovations toward this aim can support the continued redefinition of educational models, explore sources of diverse and shared meaning, behavioral patterns, and systemic structures across the lifelong and self-directed learning spectrum that is the human life experience.

In order for global culture to be infused with regenerative societal practices and for new systemic literacy's and patterns to take root that foster "anti-fragility", these practices must become massively distributed skill-sets, mastered by a critical mass of people within the population. In support of this shift there are many practices that can be utilized when defining, identifying, and creating educational prototypes and learning ecosystems that support personal, collective and global thrivability. Some of the most interesting and promising advances in education along these lines involve empathy based learning and an emphasis on empathy oriented education. In recent years there has been a rise of an empathic consciousness amongst the diverse peoples of the world, largely catalyzed by global technologies of communication. In the view of early thought leaders of the network based society such as Peter Russell (1995), Manuel Castells (1996) and Kevin Kelly (1994), the internet represents an extra-somatic form of bio-organismic need for interconnectivity, serving as the tangible expression of the extended mind of our species and creating a pre-condition for the emergence of a "Global Brain." The emerging globally connected context is characterized by unprecedented information flows that foster new levels of connection, collaboration, consciousness, and compassion. These greater levels of connection, however, also open people to unprecedented levels of manipulation and fear-based reactionism magnifying a great need for processes and practices that heal social rifts and foster life-affirming global values.

We need a debate, a new discourse about the purpose of education. We want education to enable us all to thrive in a transforming world.



VALERIE HANNON,
Director, Innovation Unit, and
co-founder, GELP

In this context, linear, reductionist, single-discipline, and mechanistic thinking and approaches are not only hopelessly out of date, they are increasingly irrelevant – even dangerous. Education purportedly prepares the learner to take “control” of their life. However, those who find themselves only caring for their own self-interest or that of their value sharing stakeholders will not be contributing to the co-creation of flourishing futures for all of humanity with the rest of life on this planet. Command and control approaches to complexity only result in solidifying borders of aggression between people and places. Therefore, the need to focus also on the thriving of others and ways to provide convivial contexts for them to engage with life is increasingly a prerequisite to survival. Within the grand challenges of our time is an opportunity to explore together and engage life through diverse ways of learning, playing, talking, dancing (art of all kinds) and co-evolve our relationship to all aspects of life, including within ourselves, between one another, with “the more-than-human world”, and across space and time. As suggested by Laszlo & Russell (2013), educational learning processes that serve thriving and foster empathy and wisdom-based society would include the following four integrated dimensions:

- ◆ *Intra-Personal*, inner flourishing, listening to self, cultivating knowledge of self, intuition, empathy, sense of authenticity and aliveness, and ultimately leading a happy, healthy and fulfilling life
- ◆ *Inter-Personal*, conviviality with others, communities, learning with and from each other, engaging in open, considerate, joyful action in order to enable collective health and wisdom
- ◆ *Trans-Species*, ecosystemic listening to and acknowledgment of our interdependence and ultimate unity with nature and all living beings, our ability to live and co-evolve with all of the biosphere
- ◆ *Trans-Generational*, evolutionary, integral, hearing the flow of what was, what is being and becoming, finding ability to play one’s own part in this dance

These are the four intertwined dimensions of systemic thriving. Empathy oriented education engages learners across all four dimensions through dynamics that encourage consciously connecting, intertwining, and cultivating the bigger story of our individual and collective being and becoming. The quality and character of this story depends on the way in which each learner is inspired to author their life along these four dimensions. These dimensions in turn offer interrelated opportunities for learners to cultivate capacities needed in a wisdom-based society through dynamic

Under [the positive scenario of the future where humans and technosphere coexist and cocreate in productive ways], the biggest skills needed will be “systems awareness” along many dimensions (including not just cooperation, but understanding that systems shouldn’t be “gamed”), and skills that deal with “growth”, avoiding boredom, and finding excitement without the need for greed, war, power, etc. This will be a very tough collection of new things for human beings to learn.



ALAN KAY,

US computer scientist, President of Viewpoints Research Institute

empathy oriented education for thriving. We need to reconnect to ourselves and the world around us, remembering that our own nature is primarily organic and living, and not mechanical. In words of Lewis Mumford (1974: 352), “we shall be able to do so only with the aid of a radically different model derived directly, not from machines, but from living organisms and organic ecosystems”; cultivating an organic worldview will allow us to reclaim our lives and “develop further man's incalculable potentialities for self-actualization and self-transcendence”.

New educational paradigms uniting the above dimensions must then emphasize meaningful participation in societal transformation and convivial relationship with oneself first, and then everyone and everything with which one interacts. Ultimately, this is an expression of love in the Greek sense of agape: it is the joy of connecting and being connected with, of affirming and being affirmed, of dancing one's path into existence with every breath, every thought, and every act that is at one and the same time oneself and the rest of the universe.

Many of the above-described practices – of fostering lifelong learners and community based learning, and increasing variety of educational ecosystemic designs – are already serving the scenario of thriving in many regards. The focus on thriving creates a focus and anchor point for such practices, envisages them not as dispersed efforts to “fix” different parts of *existing* education, but as an increasingly more concerted effort to create *new* education for the 21st century and beyond. These practices include three layers of social organization:

1. Individual practices:

- ◆ Inspiring self-direction and creation of one's own learning ecologies – or *self-guided learner pedagogy/androgogy*. Forming learners instead of “knowers” focused on accumulating static knowledge through learner empowerment, personalized learning trajectories, and transformative (incl. initiatory) learning experiences.
- ◆ Curriculum around meta-competencies including different methods of thinking, or emotional and social intelligence, in project- and practice-oriented learning, while encouraging access to facts and data, focusing on how information is integrated and discerned. Nurturing diverse forms of intelligence and the ability to connect these forms in myriad ways to adapt to current and emerging conditions
- ◆ Rise of holistic education: forming, through holistic development and existential-skills oriented methodologies and learning environments, “whole children” and “whole adults” who are able to live

Empathy is an ability – but you need a purpose for that ability. The purpose is connecting people to themselves and their own resourcefulness. Healing is empowering, focusing on people's ability to live and act, bringing their natural wisdom to reconnect



ANNELOES SMITSMAN,
Founder EARTHwise Center

happy, healthy and fulfilling lives, and are prepared to deal with the social and affective areas of their lives in the wholeness of their being.

2. **Collective practices:**

- ◆ *Embracing collective creativity* through play, art, knowledge- and technology-creation, real-world pro-activity, story-telling and story-living, being generative in order to participate in and intentionally co-evolve the systems within which we live – through various learning trajectories and spaces which allow for various forms of team- and community-based creativity.
- ◆ *Fostering collaboration* and an appreciation of reciprocity to create systemic synergies together, by integrating collaboration and conviviality as an indispensable attitude of learning processes, experiences, and spaces.
- ◆ *Learning how to thrive* together – practicing and strengthening ways of living and being that bring collective health, wellbeing, and fulfillment, including integral practices of wellbeing (e.g. qi gong and yoga), working for and within living communities (incl. urban spaces, spaces of minorities, tribes etc.), and cultivating thriving-oriented value- and mind-set.

We re-evolutionize education for an integral learning in an ascending spiral which inevitably generates a higher conscience and growth which is: more respectful, more cooperative, more fun, more holistic, more proactive, more intelligent and more loving... or in other words, we are becoming more humane and more connected.



NOEMI PAYMAL,
Founder of emAne and Pedagogia 3000 innovator networks

3. **Global practices:**

- ◆ *Cultivating ecosystems for lifelong learning:* generating (glocal) evolutionary learning communities that co-create meaning in a shared and participatory way (including the development of global online learning processes that enhance collective learning), by developing the capacity of “ecosystem gardeners” (see Section 4.4), connecting leadership and interweaving practices of various education providers, and creating methodologies and IT solutions that empower learners and providers to connect with an ecosystem
 - ◆ In content, process, and platform *empowering a globalizing citizenry*, helping to grasp and solve both local and global challenges – including, but not limited to, use of “action-based” online learning platforms and offline volunteering experiences
 - ◆ Contributing to the rise of *globally sustainable civilization* by engaging in collective sustainability- and regeneration-oriented practices, and arranging collective learning experiences that spread existing sustainable practices and cultivate sustainability-oriented innovations.

4.4 Protopia: Reimagining Our Future

An emerging paradigm in the sciences suggests that we live in a holographic, highly integral, and interdependent world [Laszlo & Laszlo, 2016]. The picture of reality depicted by this paradigm is like a dance of Universe and Cosmos – with the universe comprising the entirety of manifest being (all phenomena we experience and know through our five senses), and the cosmos comprising a deeper and even broader reality (the noumena that undergird and give rise to the universe). We can't access the cosmos through our five senses alone, but we can know it as an expression of primordial consciousness beyond space and time. Metaphorically, this is the dance of heaven and earth. As educators, our axiology tends to veer more toward one or the other. However, in a metaphorical context, which is more important for a flourishing garden, the seeds or the greenhouse? Without the seeds (which represent "earth" – the systemic leverage points for creative synergy), nothing grows and no potential is realized. Without the greenhouse (which represents "heaven" – the requisite systemic nurturance space), nothing grows and no potential is realized. To curate the dynamics of thriving education, it is necessary to create opportunities for seeds to grow and the roots to connect such that new visions may emerge and flourishing interdependencies arise. It is also necessary to set attractors that provide individual inspiration for collective aspiration, showering light, water, air and fertile soil in delicious combinations and quantities for the garden to come into full flourishing. The constant dance between doing and being – between creating conditions for learners to flourish and getting out of the way so that they can thrive authentically – this is the same dance of Universe and Cosmos, expressed on a different scale. While the dynamics of the quantum world are at a different scale than the dynamics of our experiential world, and although they operate according to different parameters and produce different patterns, the music of the dance is the same.

A shift toward new educational models requires the concerted effort of regulators, academic institutions, private businesses, NGOs and learners of all ages working with and within the educational sector; a shift of this magnitude requires multiple and interdependent stakeholders to become catalysts of a paradigm shift leading local and global change on a values and action level such that education becomes an accelerator of

We live in a world that is filled with beautiful, difficult complex systems. And how we perceive them; how we study them; how we interact with them has everything to do with the quality and the nature of our own lives and our lives together. This is cross-generational, cross-cultural and cross-species.



NORA BATESON,
President, International
Bateson Institute

societal transformation. The fact that we exist in an increasingly complex society implies that such a re-design cannot rely only on an idealized vision or a utopian vision – as any such vision may omit important dimensions and rapidly become irrelevant in the midst of the increasing pace of change. Often, visions of the future are driven not by ideals but by their opposites, dystopias, horrible fantasies to be avoided¹⁰⁵. However, the problem of dystopian thinking is that it only tells us about what should not happen, it does not provide us with a pathway towards desirable futures. Due to the increasing complexity and growing unpredictability of the future, often people prefer not to focus on the future but rather to try and solve problems of the present without regard to past results of future possibilities. Although such present focused approaches can lead to positive innovations, this myopic tendency does not allow for strategic future focused action.

Neither hoping for utopian technological or social windfalls to our challenges or fighting against dystopian fears, practices, or regimes will provide the necessary conditions for the scale of societal transformations that are needed; what we are tasked with is the creation of Protopian futures. Protopia provides an actionable alternative to utopia, dystopia or myopia, for Protopia is a possible future that is inspiring “optimistic and achievable” based upon individual and collective action¹⁰⁶. Protopia is the taking of action toward desirable futures, it’s the shared work of creating the future we want to see in the here and now¹⁰⁷. Utopias on the other hand can be inspiring, what is needed now rather than ideal possibilities are actionable and navigable pathways toward a thrivable and wisdom-based society. Given the nature of the challenges we face, Protopia is not a luxury for an entitled few, but rather a necessary context for the continuation of the human experiment on Earth. For humanity to chart clear paths into this future it will require us to learn and lead together through the conscious evolution of our complex lives and world. Protopia as a guiding vision implies that we cultivate social systems capable of adaptation and constant renewal.

The Social Labs movement for example, a model for Protopian strategic action, is an approach to “solving complex global challenges” and a strategic response, practice, and field of endeavor uniting around a prototyping paradigm [Hassan, 2014] (experiment-to-learn) rather than a traditional planning paradigm (analyze-to-predict) and fosters emergent, experience-driven and integrated strategies, more suited for complexity rather than predictive “silo” approaches¹⁰⁸. Prototyping as a response within increasing complexity allows for the real-time practicing and learning of how to respond within and collaboratively lead change in complexity in order to co-create desirable systemic

¹⁰⁵ For instance, such is the agenda of environmental movements that consistently create awareness about the negative scenarios of destroying biosphere and disrupting natural processes on our planet

¹⁰⁶ Originally coined as a concept by Kevin Kelly (<http://kk.org/thetech-nium/protopia/>), the concept of Protopia has been redefined in the context of Global Education Futures work

¹⁰⁷ <http://www.evolutionlab.org/protopia-sharedwork>

¹⁰⁸ <https://medium.com/enspiral-ales/the-relational-field-7ef-5c710bcb4>

¹⁰⁹ See [Cubista et al, 2014] available at http://www.prototypingourfuture.info/uploads/7/8/9/8/7898654/prototyping_our_future_-_pdf.pdf

To start transformation of educational systems, you need a combination of three dimensions: one is the leadership, another one is the vision, and the third one is the sense of urgency.



JAMIL SALMI,

Coordinator of World Bank's network of tertiary education professionals

outcomes¹⁰⁹. Education that utilizes Social Lab style learning and capacity building has the potential to shift the purpose of education toward personal/collective and local/global contribution while acknowledging that no one person or group can create desirable futures or outcomes in isolation. Integral change can only occur through collaboration within whole complex and adaptive systems and therefore through approaches that foster relational learning, cultural innovation, and prototype solutions that are systemically contextual, working towards “whole system prototypes¹¹⁰” (at the scale of cities or regions).

Educational ecosystems then, as a forum or laboratory for Protopian learning (or, evolutionary learning) as decentralized, self-guiding, and relational learning systems can be united by the three following key areas:

1. *Shared visioning*. Serving individual and collective learning that develops and constantly renews collective vision and values in action
2. *Actionable prototyping*. Vision and values are actualized by practicing within learning ecosystems through “being the systems we want to see in the world” (In the context of digital workplace design, this principle has been coined by Doug Engelbart and his group as “bootstrapping”¹¹¹)
3. *Open-source sharing*. Creating portfolios, through the prototyping and experimentation of open-source wisdom and best practices that can be shared throughout and between educational ecosystems.

Navigation within social spaces of increasing complexity and promotion of Protopian-oriented solutions requires new ways of thinking and acting often described as “systems leadership”¹¹². The capacities of systemic leadership include: seeing the larger system, engaging in generative and transformative conversations across the system, and co-creating futures with stakeholders of the system. Such capacity implies that leaders are no longer “heroes” that lead the change by overcoming opposing forces and mobilizing their followers, but “hosts” that curate the conditions to join together in co-creation¹¹³. This approach to learning and leadership is a prototype of living practices of the emerging future through creating learning opportunities that cultivate the “seeds of tomorrow”. The role of hosts can be seen as “ecosystem gardeners”, because (as real gardeners do) they plant, cultivate, shape, harvest and regenerate educational projects, learning communities, experiences and trajectories within complex living educational ecosystems. If transformational leaders (including startup founders and social entrepreneurs) are those that bring

Change in education will be coming from teams of change-leaders around the world working together collaboratively, systematically towards a common vision, to bring about new learning ecosystems. In order to move there, we need to pay attention to those who could build those teams – to hosts, to facilitators, to the people who are going to actually effect and help these teams become effective



ROSS HALL,

Director of Education, Ashoka Foundation

¹¹⁰ The idea of “whole system prototype” implies holistic approach to prototyping various aspects of the future society, including new economic practices, technological innovations (digital, biological etc.), new learning models, new cultural practices, healthy eating, and cultivating individual and collective well-being. These prototypes are, in fact, points of concentration of the “future society” within the society of today.

LABS FOR SOCIETAL TRANSFORMATION & SYSTEMIC LEADERSHIP

The inception of the Lab field as a way of prototyping solutions to societal challenges and innovating opportunities includes many systemic and prototyping oriented players, from **The Finance Innovation Lab**, **MaRs Solutions Lab**, **The Sustainability Laboratory**, **Roller Strategies**, **Sustainability Transition Labs** (The Natural Step), to **IDEO**, and **Reos Partners**. GEF Global Collaborators also lead a variety of Lab endeavors including **Evolution Lab** and the **Prototyping Our Future Guidebook** (Joshua Cubista), **ITBA System Innovation Lab** (Alexander Laszlo), and **ASI Boiling Point hubs** (Dmitry Peskov and Pavel Luksha).

The cultivation of “Leaders as hosts” is stewarded in communities of practice such as **Art of Hosting**, and systemic leadership capacity building through both the **Academy for Systems Change** and **The Presencing Institute**.

about change, “ecosystem gardeners” are those who work with transformational leaders to curate change, to help individuals and groups see each other and align their shared work to create beneficial relationships and increase the collaborative success of the whole system¹¹⁴.

The evolutionary learning, leadership capacity building, and relational innovation that can occur within and between systemic leaders, designers, hosts, and multi-stakeholder collectives, what we call “Evolutionary Learning Labs” or “Protopia Labs” can provide spaces for the adaptive generation of radical approaches and solutions toward the purposeful transformation of society. In order for the complex innovations, prototypes, and best practices that are being generated around the world to be made widely available in support of systemic transformation it is essential that the barriers and silos of competition and scarcity mindsets be overcome such that a rhizomatic system of connections¹¹⁵, a community of communities, or a lab or labs evolves to connect, exchange, and cultivate visions and best practices as a shared portfolio of innovation and a global commons of human creativity at increasing levels of scale, depth, and contribution. (Figure 13).

Through creative educational ecosystemic innovation and the optimization of learning experiences across the spectrum of collaborative, self-guided, and lifelong learning we can collectively curate the conditions for a transformation of society. By engaging in relational learning and innovation within and between networks committed to societal transformation and toward a thriving wisdom-based society, we have the opportunity to cultivate emergent educational ecosystems that foster the inten-

¹¹¹ <http://www.dougengelbart.org/about/bootstrapping.html>

¹¹² http://ssir.org/articles/entry/the_dawn_of_system_leadership

¹¹³ <http://www.margaretwheatley.com/articles/Leadership-in-Age-of-Complexity.pdf>

¹¹⁴ In the work of Global Change Leaders, “gardeners” are also called “weavers”, implying their capacity to connect multiple communities of practices into webs of meaning and action.

¹¹⁵ See the work of Deleuze & Guattari (1987)



Figure 13: A Lab of labs as an Evolving Educational Ecosystem

Within the ecosystem of labs the central space of the system acts as an open portfolio making the prototypes, innovations, and best practices generated across the system available to all the labs and practitioners within the whole ecosystem. Ecosystem gardeners, systems leaders, designer/hosts, and practitioners work within and between labs and throughout the ecosystem to both catalyze and cultivate learning and collaboration that supports increasing levels of impact for societal transformation.

tional evolution of our society within and beyond the biosphere. The above outlined accelerating complexity of our global context frames the need for educational systems to evolve to meet the realities of the 21st century. Both the clear need for societal transformation and the possibility of wisdom-based and thrivable futures has shaped this vision of intentionally designing our systems and processes toward desirable futures together as learners and co-creators of our shared future.

A photograph of a winding asphalt road through a hilly landscape. The road curves from the bottom left towards the center right. The hills are covered in dense green trees and shrubs. The sky is a clear, bright blue. The entire image has a teal color overlay.

5

CONCLUSION: AN INVITATION

Throughout this document we have suggested that education is on the needed pathway toward the massive redesign of its purpose. Forces that shape the future of our society – that make it more connected, more abundant, and more sustainable – will also reshape the ways we learn individually and lead collaboratively toward our collective potential.

We also highlight that education as an avenue for individual and collective development and the evolution of our civilization needs to become instrumental in inducing, cultivating, and governing change for the betterment of society and our biosphere. Educational innovators therefore must become leaders and navigators of the trajectory of “Spaceship Earth”, our home that is in need of our healthful and regenerative presence and actions. It is not through sophisticated policy making or controlled digital media, but rather through grassroot driven social movements inspired by relational and cultural innovation that we will cultivate new ways of thinking and acting as individuals and in communities. As our global society moves toward guided evolution and toward wisdom-based and thrivable futures we have the opportunity to foster radical innovation to the roots of what it means to be and become a human being in the 21st century.

While the vision of regenerative societal transformation through educational ecosystems is a future within our reach, so too is our potential failure a possibility on the horizon; the societal systemic failure of complex human civilization. If we are to navigate toward the vision outlined and aimed for in this report, it can only happen through us, and it will take all of us. As the often-cited Hopi prophecy states, “we are the ones we have been waiting for” – there is no one else but the current generation that should hear the call, take the challenge, and lead the transformation. Around the world there are many needed approaches to evolving “education of the future”, yet still too few aim to collaboratively address the magnitude of the complex challenges ahead. We are therefore, sending out a call – to those who are able to hear: we invite citizens, institutions, policy makers, learners of all ages and lovers of life to explore and refine with us this vision of educational ecosystemic innovation, to use it, share practices, and prototype with us such that we can together create Protopian futures on Earth. Let us together plant “seeds of tomorrow” as experiments, systems, and organizations that foster regenerative local and global education and learning. Let us unite our efforts as a community of communities – a societal evolutionary learning lab on Earth. Let us join together in fostering our collective potential through educational and learning ecosystems that both address the challenges of today and cultivates a human legacy we can offer to the generations of tomorrow.

ABOUT THE AUTHORS & AUTHORS NOTE: VOICE OF LEARNERS



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nology innovation management education, authored Skolkovo-Rosatom program (that received EFMD Excellence in Practice Award), and co-founded Russian R&D Directors Club. He also initiated and catalyzed NeuroNet initiative which since 2014 has become Russian national consortium in brain research and neural technologies. He is the author of *Global Education Futures Agenda*, a visionary book on transformative role of education technologies (available at www.edu2035.org), and the Atlas of Emerging Jobs, one of the most detailed global compendiums of new and emerging jobs (available at www.atlas100.ru/en) – both of these works have catalyzed systemic innovations in Russian education system and across emerging economies.

PAVEL: *How do we know it is time to change? How do we know that things that might have worked in the past don't work anymore?*

*I know this when I enter the room full of teenagers and ask them: "Who of you thinks that your school will not prepare you for your future life – even now?" – and **all of them** raise their hands.*

I know this when I look around and realize that in my megacity of fifteen million people there is no school that could accommodate my youngest child who is now three – for she is too smart, too sensitive, too open hearted, too ready to change the world. No existing education would suit her – but she also needs education, she needs her own discipline, she needs peers to learn with and mentors to learn from, she needs others to accompany her on her journey. How can I create a space where her energy will be welcomed, her heart and her mind will be nourished, where the world will open all possibilities for her?

I know this when I recall my own learning experiences – many, many wonderful happenings. As a child, I was lucky to get immersed in some of most forward looking educational experiments of that time, and in my adolescence, I was lucky to learn from older people with rebellious views and unconventional life paths, and in my adulthood, I am lucky to work and play and cocreate with some of the most talented people of my generation. Yet almost none of these amazing and inspiring journeys I can credit to my formal education. I am here and I am me despite – despite the time and effort I spent in schools and universities. But I also know, from those who taught me and from those with whom I teach now, that things can be different, that education can become sexy, can become awesome, can become inspiring and life-changing. This is what inspires my practice, and this what drives my vision.

And I want to look into the eyes of my youngest daughter and tell her that there is a place for the likes of her to learn. A space that answers to this youngest generation's needs. Where the likes of her can be themselves, can become themselves.

I want to look into eyes of those teenagers and tell them: we will not betray you. I want to help them bring their love and pure intentions to help heal our world.

For we are setting ourselves in tune with the emerging world, we are finding our role in the universal evolution, for we are mothers, babies, and midwives of this emerging world. And so, I know it is time to change.



JOSHUA CUBISTA is an international experiential designer, facilitator and strategist focusing on personal, social, and systemic leadership capacity building. He is the author of *Prototyping Our Future: Social Labs For A Sustainable, Regenerative & Thriving Future*, and is the founder of *Evolution Lab*, a research platform and design atelier offering experiential and experimental prototyping and leadership innovation processes for organizations, communities and multi-stakeholder groups. Additionally, Joshua designed and teaches the Permaculture For Systemic Change course at Prescott College, is a Global Collaborator with Global Education Futures and Protopia Labs, a strategic advisor to the global program innovation team at WE, and is a co-founder of The Global Change Leaders, a collaborative dedicated to educational systems

change worldwide. He is a Fellow with the Academy For Systems Change and an ambassador with the Biophilia Foundation, a Global Sustainability Fellow with The Sustainability Laboratory, and a Fellow with the Institute For Sustainable Social Change at Prescott College. Joshua's work unites human potential, collaborative leadership, and Social Lab approaches to co-creating optimal responses to the complex opportunities and challenges of the 21st century.

JOSHUA: *My whole life I've been traveling the world. Everywhere I've been thus far I've noticed that underneath our 7 billion + ways of navigating the world, our mosaic of approaches to moving toward our highest potentials, or the ways each one of us yearns for our deepest aspirations, people generally want to live healthy, happy, and contributive lives and offer this same opportunity to their children.*

How then, when the basic values of our lives are more often similar than not have we created so many diverse and creative ways to grieve, praise, make meaning, and have fun?

Similarly, when surrounded by such Earthly abundance, how have we destroyed so much of our biotic community in the biosphere, and degraded so much of the cultural heritage of our human family?

We have become an evolutionary power as individuals, communities, and as a global species, the very web of life is moved by our dancing. What would it be like to live in a world where our ways of learning, leading, and living prepared us to be well in and with our places, to love well with our people, and to make the world a more beautiful and living place for all, simply through our being here?

When I've asked people around the world "what is one of the things you love most about being alive?" the answers are very often the same: love, adventure, travel, learning, creating, good food... what fun would it be to design educational and learning systems that unite us through what we love toward our collective potential as navigators and collaborative leaders of our shared evolution.

As travelers we each have unique journeys, on Earth however we all have a shared destiny to live, love, and learn together. It may be that the crucible of the 21st century will inspire and ignite the best of human endeavor; education then can be a source by which we cultivate and celebrate what it means to be fully alive with radical integrity, fierce love, and in authentic presence in our shared work and play.



ALEXANDER LASZLO is the 57th President and Chair of the Board of Trustees of the International Society for the Systems Sciences (ISSS), Director of the Doctoral Program in Leadership and Systemic Innovation at ITBA, Argentina, and former Director of the Doctoral Program in Management at the Graduate School of Business Administration & Leadership (EGADE-ITESM), Mexico. As Professor of Systems Science and Evolutionary Development, he currently teaches on evolutionary leadership, collaboration, and systems thinking at a variety of MBA and Doctoral programs internationally, and serves as President of the Honorary Board of Advisors of the World Complexity Science Academy (WCSA). He has worked for UNESCO, the Italian Electric Power Agency, and the U.S. Department of

Education, has held visiting appointments with the London School of Economics and the European University Institute, and has been named a Level I Member of the National Research Academy of Mexico (SNI). He is on the Editorial Boards of six internationally arbitrated research journals, recipient of the Gertrude Albert Heller Award, the Sir Geoffrey Vickers Memorial Award, and the Förderpreis Akademischer Klub award, author of over seventy-five journal, book, and encyclopedia publications, and a 5th Degree Black Belt of traditional Korean Karate.

ALEXANDER: *When I listen to and empathically hear the struggles of young people with schooling – from all walks of life and all parts of the planet – rather than filling me with hope, pride, and fond memories of my own experience in formal education systems, I am most often fill with concern, shame, and deep sadness. Why is this? It seems to me that the deeper reason for this upwelling of discouragement comes from seeing bright lively minds and hearts run through standardization processes that force routinization of the human spirit.*

But there is hope! Not only in the sorts of visions, values, and vectors of change outlined in this report, but from young people, themselves! The youngest generation to make it into census data reports is often referred to as the Phoenix Generation (Kingsley Dennis has a book out by that name), and those in that specific time-based culture are called this because they do believe in the future (even if they don't believe in the present regime, much like the Millennials who precede them). What is it that they believe in, want, and need from an education system?

That's the question that I have been listening into and learning about with my daughter who is right at the Millennial-Phoenix cusp. When I see what makes her and her friends come alive and also note what deadens them and numbs them out, I see a real focus on relational ways of knowing and being. What they know at some deep level of being is that relationships matter. Now, this doesn't mean that every Phoenix child is an empath, but it does mean that they appear to have greater openness, interest, and willingness to learn about interdependencies. In other words, the questions of how we can do things together, how we can co-exist with the rest of the planet (not merely on it), and how and why we should care (for ourselves, for each other, for the more-than-human world, for our ancestors and future generations, and for the whole cosmos) are heartfelt concerns and interests of many Phoenix children.

I think this kind of relational way of being begs for empathy based learning, as explored in this report. And where could that lead? Why would it be important? It could lead to a more caring, integrated, mutually supportive, and less violent expression of human presence with Earth. And that's important! As our species grows in number and becomes ever more interconnected and interdependent, the ability to co-exist is becoming vital to our future. Human dignity entitlement is being threatened throughout the world in this day and age, and that is at the heart of why Phoenix children (and certainly Millennial adolescents and young adults) don't believe in the status quo. My daughter recently started an online social media site called TEH – The Empathy Hub. It is "a place where you can come to give and receive comfort, advice, and empathy." Just that. To be with each other. To care. Why is this needed? Because it's not found in most schools these days. In some, yes. And that's what this report is about for me – it is about what is emerging, what needs to emerge, and what we can do to help emerge new ways of being, doing, learning, living, and loving as fully human beings. This is the hope – it is in our children, and so it must also be in us!



MILA POPOVICH is the Founder of EVOLvED Leadership – program, consultancy and community for transformational leadership on the scale of personal excellence, organizational development, systemic innovation to planetary path-finding. Mila develops and furthers the potential of individuals, businesses and communities for superior performance. As an independent academic, she is a humanities expert, systems thinker and futures consultant. An international lecturer and speaker, she specializes in ecological literacy and sustainability, value drivers of the new economies, peace and cultural diplomacy, new paradigm of human development and creative sides to future making. She is the Chair of the Membership Communications Committee at the World Academy of Art and Science. She is a Global Collaborator at the Global Education Futures (GEF) and a co-author of the GEF Report, Educational Ecosystems for Societal Transformation. Mila is the Co-Chair of the Global Blockchain and AI Council and a Founding Member of the Global Women in Blockchain. She is a Fellow of Vital Voices – Global Women’s Leadership and an Associate Expert on ethics and gender issues at the European Commission. As the proponent of

eco-conscious business, Mila serves on the Executive Committee / Brains Trust of Hazel Henderson’s Ethical Markets Media. She is an Expert on the Gender Equality Impact Panel of the Katerva Award – the so-called “Nobel Prize in Sustainability.”

Mila has developed a distinctive spectrum of practices – a confluence of academic engagements and artistic creations – for the art and science of transformation, which she lectures on and teaches internationally. She draws on her cultural range from native Montenegro and resident USA for her artistic expression as a performing artist in multiple dance forms, bilingual poet and experimental theater art director. She is an educational and social innovator and creative entrepreneur – a social artist sourcing her diverse engagements as an academic, artist and activist to engender social transformation and systemic change for individual and collective thriving.

MILA: *The first memory of self and / in the world opens up in the space of my wide-eyed gaze at the vast, star-filled sky that I watched from a small fern hideaway at my grandparents' farm. That awe felt like something was swelling up in my chest and wanted to grow toward that vastness and connect in my core the worlds of the sparkling specs in the sky and the shimmer of the fireflies that entered my hideaway. Yearning to catch the stars and bring them closer, I would, in their stead, get a jar and scoop fireflies that filled the night. After carefully poking holes in the lid so they can breathe, I would take them into the house and watch their glow under my cover propped up into a little tent on the bed. The stars were then in my room, fascination with which would have me wake up in the morning with slightly blood-shot eyes. I heard my worried grandmother tell my mom: "I know you think she is still tiny and delicate, but this child is ready for school."*

Many years later, I read about Arabic astronomers who spent their nights staring into the skies and whose desire to know them closely left them with blood-shot eyes and forever straining toward the cosmic. But this reassuring connection with other star-gazers came after so many, painfully confining years of going through schooling that not only broke down my fern cocoon but shattered, in the process, the thrill with which I walked, wide-eyed and eager, into the classroom for the first time. If it were not for the loving care of one of my early teachers, I would have lost the burning light in my core that the stars and the fireflies lit up into a sweet amber of inextinguishable desire to know their worlds and myself with them.

It is that desire that sparked off into a lifetime of continued education in hopes of re-generating that self-expanding awe, but also in hopes of finding spaces and ways of schooling that can nurture that sense in others and with others – communities of fellow star-gazers whose enchantment with life, life's processes and natural phenomena keep them ever aspiring and evolving. That search developed into a greater vision of education with peers who know that they are, rather, co-creators, bound with each other in transformative growth.

And now that I have children of my own and witness again the same struggle in an outdated and rigid education that they, too, have to undergo because the alternatives are few and far in-between, I choose to engage all of my heart and mind power to transform systems that do not recognize, honor and nurture the amber of their being and activate it according to its inherent potential to follow the firefly and become the flame.

The transformation, however, is under way. I see, here, and want to see through the new initiatory schooling – the new culture of learning and educational ecosystem that attends to the thresholds, transitions and transformations of the self and/ in the world. Such culture is made up of wholesome learning communities that honor different stages of the learning process; support ranges of learning styles and rhythms; develop multitude of disciplines into holistic vision and purpose. Most importantly, such transformational system attends to and sustains us through vital stages of our greater development – our diversified selves and our phases in a lifetime in co-relation with the greater patterns and rhythms of life and in tune with the beautifully intelligent design that makes the fern unfold, fireflies glow and stars abound.



IVAN NINENKO is a lifelong learner, doer and player. He is the head of Tutors team at the University of National Technology Initiative, the head of Deep Humanism Laboratory in the International School of Human Rights and Civic Actions, and the curator of the Neuro Sync project, exploring new types of artistic collaboration via neurointerfaces. Previously, Ivan has been long time civic activist with Youth Human Rights Movement (yhrm.org), Federation of Young European Greens (FYEG.org) and eventually the Deputy Director of Transparency International for Russia. He held anticorruption TV show on Dozhd, and founded Anticorruption Policy Laboratory in Higher School of Economics. In 2013 he became visiting scholar at the Havighurst Centre for Post-Soviet Studies

in Miami University (Ohio, USA) and was an active member of Faculty Learning Community on Mindfulness and Contemplative Practices in Higher Education. Also, Ivan is an expert in live action role playing games in education and development, designing dozens of games for kids and adults that can be played in classrooms, summer camps or during conferences.

IVAN: Learning is a never-ending process. It is a simple idea, but it is enough to keep me motivated for doing most of the things in my life. I have no idea when it finally got into my head, I thinking I am still trying to grasp it. "Why should I learn? I will die anyway, so studying does not matter" – that was a question I asked my parents one day refusing to do my school homework. I was a troublesome kid that enjoyed learning things I liked – especially math and physics – and doing my best to avoid learning things I hated – like Russian language or physical education. The biggest gap in what I loved doing and what I hated in school was reading literature. I was growing up right during the collapse of Soviet Union, so I was enjoying the variety of books being published after years of censorship. Every weekend I would go to a local market to see a man who was bringing those books to our small town and ask him if he has any new sci-fi or fantasy books. Like a regular geek I would know all the details of Frodo's journey and all the specs of the ion drive. The next day at school I would be asked about inner struggles of characters in Dostoevsky's novels. "Why do we need to read this?" – "Because our curriculum says so". This is the answer that destroys the main purpose of education – developing the ability to reflect upon oneself and outer world, the ability to get closer to the answer to the ultimate why question.

I did enjoy Dostoevsky eventually, once the school was over and I was ready for such literature. But this situation sparked my hesitation about education which is so disconnected with the passions of human beings who happened to play a role of student in this particular period of their life. I don't believe that we can learn something "because our curriculum says so". Students can train themselves to pass the test, but this has nothing to do with education. I strongly believe in the internal motivation of any consciousness to learn and develop; thus, education should be a process of creating an environment that supports those passions.

The best news is that our modern world allows and requires us to make such a transformation of education. My personal experience, coming from learning and teaching in Russia and in United States, proves that it is already possible to build educational process with an evolving curriculum, connecting vast variety of online resources available and using time in the classroom for collective reflection, contemplative exercises and experience based learning. Main point is to keep on learning, even when you are a teacher or when you cooperate on a report like this one.

So let's keep evolving and see where education will go as it becomes alive.

About Global Education Futures

Global Education Futures originated from many discussions, unconferences, workshop and learning games held by Russian educational innovators community in 2008-10. A pivotal point for this community came in Autumn 2010 when Pavel Luksha together with Dmitry Peskov developed the methodology of Rapid Foresight (a highly efficient open foresight method) and conducted the first foresight on the future of Russian education. In 2011, with the founding of *Russian Agency of Strategic Initiatives* (<http://asi.ru/eng/>), where Dmitry has been appointed as the director of Young Professionals division, the co-created vision started to take grounds at the national scale, and over a hundred of systemic innovation projects in higher, vocational, and complementary education have been since then supported by the Agency. Also, the vision of future education has become grounded in working with leadership teams of top Russian universities, accomplished with *Skolkovo Education Development Center* where Pavel is a Professor of Practice. Rapid Foresight methodology proliferated as a method of cultivating long-term thinking in many Russian decision- and change-makers, and since 2014 is being applied in international projects in Africa, East Asia, and Latin America. Groundbreaking formats of “visionary retreats” based on Rapid Foresight such as *Foresight Fleet* – arguably, the largest “future awareness” event in the world – helped catalyze emergence of systemic innovations, including industries of tomorrow¹¹⁷, in Russian business and social change communities.

In 2012-15, thousands of business leaders and startup entrepreneurs, educators, researchers, students, policy makers, participated in over a hundred Rapid Foresight-based sessions on the future of education & learning, future of competencies (that involved expertise from over 25 sectors of economy, from agriculture and biotech to aircraft manufacturing and oil&gas industry), future of childhood, future of healthcare, future of cities, future of media & Internet, and more. This work allowed to create fertile grounds for the international dialogue with the educator community, published as *Global Education Futures Agenda*, a book coauthored by Pavel Luksha and Dmitry Peskov.

Since Autumn 2014, *Global Education Futures* (GEF) grew up as an international initiative that started to bring together “shapers and sherpahs” of education of the future, that include global visionaries and practitioners, internationally renowned educators, administrators of global educational institutions, ed tech entrepreneurs, national policy makers and international policy advisors, and more. It was the moment when Alexander Laszlo has joined GEF as a member of its Advisory Board and started to play active role in advancing its agenda. Through 2015 and 2016, over 500 leaders of education from over 50 countries of the world have participated in over a dozen vision building sessions that took place in different parts of the planet,

¹¹⁷ <http://asi.ru/eng/nti/>

from Menlo Park, California, and Buenos Aires, Argentina, to Auckland, New Zealand, and Johannesburg, South Africa. A truly global “core” community of like-minded practice-oriented visionaries – including GEF Global Collaborators and Advisory Board – started to originate from these conversations. Joshua Cubista a “Learning for Emerging Social Practices” vision contributor (GEF California, 2015), and Ivan Ninenko both became Global Collaborators of GEF advancing the global education vision and activities in Spring 2016, and Mila Popovich became a Global Collaborator in Summer 2016.

A number of initiatives originated from, or were inspired by, Global Education Futures in 2015-17, transforming GEF into a *think-link-do tank* on global lifelong learning ecosystems:

- ◆ In Spring 2016, during GEF meetings in Moscow and Prague, the group of educational innovators from ca. 15 countries in Europe, North and Latin America initiated a *Protopia Labs* movement, a prototype community of change leaders in education. The prototype movement has conducted three large international gatherings (in Cyprus, Latvia, and Russia) and launched several cross-national collaboration projects on sustainability-oriented learning, transformation of universities, and platforms for competence-based education; it also commenced two new “labs” in Serbia and Belarus. Also, with the support of *Rybakov Foundation*, GEF and Protopia Labs have initiated the global mapping of educational “ecosystemic” innovators, framing the definition and criteria of ecosystemic education, and creating a prototype map for Russia, Ukraine, Kazakhstan, Armenia, and Baltic States. A prototype of a whole educational ecosystem for technological entrepreneurs and specialists in new technologies was commenced in St. Petersburg in 2017.
- ◆ In Autumn 2016, GEF became the co-founder of *Global Change Leaders Collaborative*, an initiative aimed at developing whole persons and changemakers of the world through lifelong learning ecosystems. The initiative was commenced by Ross Hall (Director of Education, Ashoka Foundation) and joined by leaders of Global Education Leaders Partnership, ASCD, OECD, United World Colleges, and others. At this point, initiation of multiple projects of learning ecosystem creation is underway in different parts of the world, from Washington, DC, and St. Petersburg, Russia, to Austria, India, Catalonia, China, and more. The inauguration of Global Change Leaders happened on 31 January - 3 February 2018 in Lyon, with 250 educational innovators from 40+ countries participating in the official movement launch.
- ◆ In Summer 2016, a Russian movement of *Living Cities* (founded by Lev Gordon, GEF Global Collaborator) has decided to launch an experiment on *Cultural Educational Hubs*, a concept largely inspired by GEF's

work on Evolutionary Learning Communities (see Section 3.3). This voluntary experiment was joined in 2017 by civil activist and social entrepreneur groups in 10 cities of Russia that launched different models of Cultural Educational Hubs across Russia.

- ◆ In late 2015, Global Education Futures gave life to *Voice of Youth*, an initiative aimed at representing young learners' voice in the educational system, and empowering them to become shapers of social systems of tomorrow. A special methodology of children-empowering dialogues was created, and multiple vision building sessions with young learners (age 9-16) were conducted across Russia, and also pilot sessions were conducted in Sebastopol (California, USA), Buenos Aires (Argentina), Riga (Latvia), and Varna (Bulgaria). Several ideas generated by young persons were already supported at scale by adult social entrepreneurs, including Kids Friendly movement that started to transform thousands of businesses, already in 7 countries of the world, into child-friendly spaces.
- ◆ Since 2017, GEF has joined forces with *Global Venture Alliance* (GVA)¹¹⁸, a globally distributed ecosystem of leaders oriented to solving global problems in entrepreneurial way. The hallmark product of GEF-GVA collaboration is EntreTeenEurship educational program (formerly Teen-Start), helping teens (age 12-16) to follow their call of creating better world through startups.
- ◆ Global Education Futures has informed a number of transformational projects in education for local and national institutions. One of the remarkable cases was performed by *Instituto Tecnológico de Buenos Aires* (ITBA) that has revised its long-term strategy to become student-centered and interdisciplinary practice-oriented "community of communities", and has also created the Doctoral Program in Leadership and Systemic Innovation¹¹⁹ to serve leaders and communities of Argentina and Latin America, as well as the Center for the Study of Systemic Innovation (CEIS).
- ◆ Finally, in late 2017 Global Education Futures has been officially established as a foundation based in the Netherlands, providing a legal "home base" to the initiative.

¹¹⁸ <http://www.gva.vc/en/>

¹¹⁹ <https://www.itba.edu.ar/doctorado/innovacion/>

Ongoing content creation from October 2014 to October 2017

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GEF Report Authors:

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GEF Report Interviewers:

Pavel Luksha, Vlad Sakovich, Ivan Ninenko, Lorraine Randal, Mila Popovich, Alexander Laszlo, Alexey Statsenko

Foresight facilitators (2014-2017)¹²⁰:

- ◆ Darshan Elena Campos (Global Learning Platforms, GEF California)
- ◆ Joshua Cubista (GEF Prague, Futuriser Cyprus, Rad Lab California)
- ◆ Lev Gordon (GEF Moscow)
- ◆ Kristina Kashfullina (Learning for Emerging Social Practices, GEF California; Global Agenda for Skills Development, GEF Kazan)
- ◆ Mikhail Kozharinov (GEF Moscow & Prague, Futuriser Cyprus)
- ◆ Yiannis Laouris (Futuriser Cyprus)
- ◆ Yuri Lapshin (Education & Training Systems, GEF Kazan)
- ◆ Alexander Laszlo (Skills for Guiding Anthropocene, GEF Berlin)
- ◆ Kahlia Laszlo (Voice of Youth sessions in California & Argentina)
- ◆ Kathia Laszlo (Resilient Cities & Communities, GEF California)
- ◆ Ekaterina Loshkareva (partner sessions with WorldSkills and BRICS Skills Development Working Group)
- ◆ Ekaterina Luksha (Voice of Youth sessions in Russia, Latvia, and Bulgaria)
- ◆ Alexei Morozov (Education & Training Systems, GEF Kazan)
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- ◆ Kennan Salinero (Models of Knowledge Creation, GEF California)
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- ◆ Vladimir Sinelnikov (Global Learning Platforms, GEF California)
- ◆ Dmitry Sudakov (Resilient Cities & Communities, GEF California; Global Agenda for Skills Development, GEF Kazan May 2015)
- ◆ Pavel Surkov (Human-Centered Services, GEF Kazan)

¹²⁰ Titles in this list indicate sessions / groups facilitated by the person during GEF events

GEF Vision Report interviewees:

- ◆ Alexander Asmolov, CEO, Federal Institute of Education Development (Moscow, Russia)
- ◆ Nora Bateson, President, International Bateson Institute, and filmmaker and writer
- ◆ Cees Donkers, CEO QASE and former City Urbanist (Eindhoven, Netherlands) **
- ◆ Henry Etzkowitz, President, Triple Helix Association, and Visiting Lecturer, Stanford University *
- ◆ Charles Fadel, President, Center for Curriculum Redesign (Boston, MA) *
- ◆ Mei Lin Fung, Co-founder, People Centered Internet
- ◆ Ross Hall, Director of Education, Ashoka Foundation (London, UK), and founder of Global Change Leaders Collaborative *
- ◆ Valerie Hannon, Co-founder and Director, Innovation Unit and Global Education Leaders Partnership (London, UK) *
- ◆ Yaacov Hecht, President, International Democratic Schools (Tel Aviv, Israel)
- ◆ Garry Jacobs, CEO of the World Academy of Art & Science, and Chairman of the Board and CEO of the World University Consortium
- ◆ Alan Kay, President, Viewpoints Research Institute (Los Angeles, CA)
- ◆ Yiannis Laouris, Founder and Chair, Future Worlds Center (Nicosia, Cyprus) **
- ◆ David McConville, Co-director, Buckminster Fuller Institute (San Francisco, CA)
- ◆ Jerry Mintz, Founder of Alternative Education Resource Organization (New York, NY)
- ◆ Claudio Naranjo, Founder of SAT Institute, psychotherapist, founder of psychedelic therapy (Berkeley, CA) *
- ◆ Yuhyun Park, Founder and Chief Citizenship Officer, DQ Institute, and Chair, Infollution Zero Foundation (Singapore)
- ◆ Naomi Paymal, Founder, emAne and Pedagoogia 3000 (La Paz, Bolivia) **
- ◆ Roberto Poli, UNESCO Chair in Anticipatory Systems, University of Trento
- ◆ Marc Prensky, Founder of Global Future Education Institute (New York, NY)
- ◆ Howard Rheingold, Founder of Rheingold U (Mill Valley, CA) *
- ◆ Jamil Salmi, Head of Network for World Bank tertiary education experts (Bogota, Colombia) *
- ◆ Peter Schedrovitsky, President of G.P.Schedrovitsky Foundation (Moscow, Russia)
- ◆ Andreas Schleicher, Director for Education and Skills, Organisation for Economic Co-operation and Development (OECD)
- ◆ Dennis Shirley, Professor of Education, Lynch School of Education at Boston College
- ◆ Anneloes Smitsman, CEO EARTHwise Center (Mauritius) *
- ◆ Ralph Wolff, Founder and President of The Quality Assurance Commons
- ◆ Georgette Yakman, Founder, STEAM Education (Marion, VA) **
- ◆ Federico Mayor Zaragoza, the Chairman of the Foundation for a Culture of Peace, and Director-General of UNESCO from 1987 to 1999

* *Members of Global Education Futures Advisory Board*

** *Global Collaborators of Global Education Futures*

Key content sessions of Global Education Futures and affiliated initiatives

GEF California (1-3 April 2015, Menlo Park CA) "Towards Learner-Centered Lifelong Learning"

GEF Kazan (22-23 May 2015, Kazan, Tatarstan, Russia) "Future Skills & New Solutions for Education & Training"

GEF Berlin (2 & 5 August 2015, Berlin, Germany) "Skills for Guiding Anthropocene"

GEF expert session @ EdCrunch 2015 (15 September 2015, Moscow, Russia) on "Future of Global Online Learning Platforms"

GEF workshop @ FICCI Higher Education 2015 (4 November 2015, New Delhi, India) on "Future of Education in BRICS & India"

GEF workshop @ GELP 2015 (23 November 2015, Auckland, New Zealand) on "Wisdom-Based Society" and "Design of Educational Ecosystems"

GEF Moscow (1-3 March 2016, Moscow, Russia) "Grounding GEF Vision"

GEF Prague (27-28 April 2016, Prague, Czech Republic) "Designing Evolutionary Learning Labs Movement"

GEF workshop @ Johannesburg (15-16 April 2016, Johannesburg, South Africa) on "Future of Education in BRICS & South Africa"

GEF workshop @ Buenos Aires (9 May 2016, Buenos Aires, Argentina) on future of technological education in Argentina (for ITBA)

GEF Colorado Starhouse workshop (2 August 2016, Boulder, Colorado): GEF Vision report design session

GEF workshop @ Monterrey, Mexico (23 October 2016): Challenges of Guided Socio-Technical Evolution

Protopia Lab Futuriser #1 (31 August – 6 September 2016, Pyla, Cyprus)

Protopia Lab Futuriser #2 (8-14 December 2016, Riga, Latvia)

Voice of Youth sessions: held in Russia, the US, and Argentina from December 2015 to March 2017

Global Change Leaders Collaborative meetings: 24-25 November 2016, Beijing, China, and 22-23 March 2017, Vienna, Austria

Radical Life Lab: Explorations On The Edge Of Complexity (7-9 April 2017, San Francisco, California)

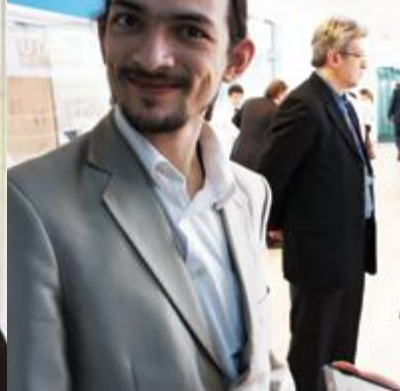
First International Congress of emAne "New Education and Culture of Peace" (1-3 September 2017, Santiago, Chile)

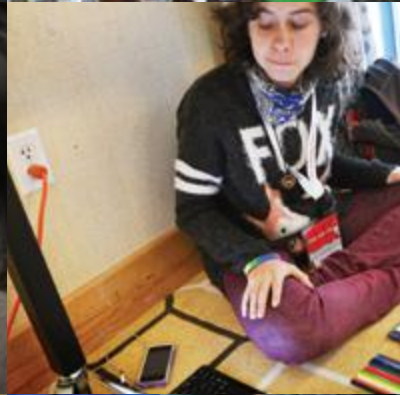
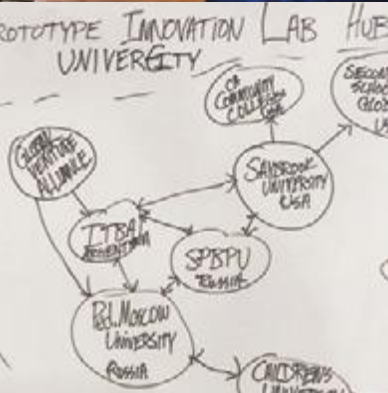
Collective Intelligence Learning Lab at ITBA (12-14 September 2017, Buenos Aires, Argentina)

Voice of Youth sessions: held in Russia, the US, Argentina, and Bulgaria from December 2015 to March 2018

Global Change Leaders Collaborative meetings: 24-25 November 2016, Beijing, China; 22-23 March 2017, Vienna, Austria; 31 August 2018, Paris, France; 8-12 October 2018, Amsterdam, Holland

**PHOTOS OF GLOBAL
EDUCATION FUTURES SESSIONS
HELD IN 2015-2016**





Gratitude

We are grateful to all participants of GEF foresight and vision sessions held in We are grateful to all participants of GEF foresight and vision sessions held in Menlo Park (California), Boulder (Colorado) and San Francisco (US), Kazan and Moscow (Russia), Berlin (Germany), New Delhi (India), Johannesburg (South Africa), Auckland (New Zealand), Buenos Aires (Argentina), Pyla (Cyprus), Prague (Czech Republic), Riga (Latvia), Monterrey (Mexico), Beijing (China), for their great insights, ideas, and emotions that have contributed to the essence of this report. We are thankful to members of Global Education Futures Advisory Board whose wisdom and experience helped guide this initiative since its inception. Founders and members of Ashoka Foundation, BRICS Skills Development Working Group, WorldSkills International and WorldSkills Russia, Global Education Leaders Partnership, Global Change Leaders, Global Technology Symposium, SAT Institute, Instituto Tecnológico de Buenos Aires have been very helpful and supportive in creating spaces and opportunities for discussion and contributing to the development of GEF. We would like to thank members of our team who worked closely with us to make this journey possible, including Ekaterina Loshkareva, Ksenia Andreeva, Olga Duka, Kristina Roppelt, Mikhail Kozharinov, Maria Rodionova, Alyona Surikova, Oleg Muromtsev, Vlad Sakovich, Lika Chekalova, Andrey Ponomarev, Petr Levich, and Pim van Geest. Also, we are grateful to those close partners who have helped move our ideas, knowledge, practices forward, moving us towards this report: Cees Donkers, Yiannis Laouris, Kennan Salinero, Lev Gordon, and Erin Blanding. Kahlia Laszlo was the first “test pilot” of the Voice of Youth international project, conducting two of its sessions in California (US) and Argentina. A great thank you goes to those who helped support this work organizationally and financially: Eduard Galazhinsky, Artyom Rykun, Viktor Demin and their colleagues at Tomsk State University, Alexey Sitnikov, Ivan Khlebnikov and their team at Skolkovo Technology Institute, Robert Urazov and his team at WorldSkills Russia, Dmitry Peskov and Svetlana Chupsheva and their teams at the Russian Agency of Strategic Initiatives, Sergey Solonin at Qiwi, Alexey Nechaev at Faberlic, Mikhail Kozharinov at Soling, Denis Konanchuk and Olga Nazaykinskaya at Skolkovo Education Development Center, and Magomed Musaev and Abdul Adbulkerimov at Global Venture Alliance. Dmitry Peskov is a long-time collaborator of the initiative who encouraged its movement into the global space and also constantly challenged its “romantic” vision and inspired it to constantly become practice-relevant. Finally, Ekaterina Luksha has not only worked as the key organizer of several GEF sessions, but has also gave incredible emotional support throughout the whole process and became a leader of “Voice of Youth” practice created within GEF. And Nika Luksha, born the same year as this international initiative, has been the muse of the evolving GEF vision for the future.

Glossary ¹²¹

ACTIVE SENIORS

people over 65 that actively continue to work, travel, create, and learn.

AUTOMATION

a process of replacing physical and intellectual human labor with automated and often autonomous solutions, including robotics and algorithms.

COLLECTIVE LEARNER

a group, a community, or an organization that is engaged in collective knowledge creation, retention, and transfer – so that over time it accumulates certain unique group-specific distribution of knowledge and combination of skills..

COMPETENCY

an ability to perform certain activity in the certain context according to certain measurable standard (e.g. reading a book, acting on stage, coding an algorithm, etc.)

COMPETENCE-BASED EVALUATION

evaluation based on observable actions of a learner, that confirm his / her competency in a certain domain of human activities.

CONTEXT-SPECIFIC SKILL / KNOWLEDGE

skill and knowledge that can only be applied in a context strictly defined by a social or human situation and / or presence of certain tools & instruments. Most so-called “hard” skills are context-specific

CROSS-CONTEXTUAL SKILL & KNOWLEDGE

unlike context-specific skill / knowledge, this type of skill & knowledge can be applied across a significant variety of social situations, and in the presence of various tools. Some “hard” skills are also cross-contextual, e.g. reading, writing, and calculating.

DIGITALIZATION

a process of proliferation of digital technologies, increased use of digital media, and spreading of digitally mediated social and economic processes

¹²¹ Please note that we redefine some key terms for the purpose of this Report

ECOSYSTEM

a system of interconnecting and interdependently evolving yet diverse entities that occupy a shared space of opportunities (e.g. a variety of species in a forest, or a variety of stakeholders that work with and influence certain cohort of learners)

EDUCATION

a variety of institutional and technological processes that support personal and collective learning and development in the whole human [learning lifecycle](#), from or before birth and until death.

EDUCATIONAL ECOSYSTEM

a dynamically evolving and interconnected [ecosystem](#) or network of educational / learning spaces, with individual and institutional [learning providers](#), that offer a variety of learning experiences to individual and [collective learners](#) across the [learning lifecycle](#).

EDUCATIONAL TECHNOLOGY

software and hardware that mediate, support, or enhance individual and collective learning processes.

EMPATHY BASED LEARNING

exploration of, and engagement with, the way in which learning, playing, talking, dancing, and all aspects of life as art connect us to ourselves, to each other, to the more-than-human world, and across time to past and future generations of all beings.

EMPATHY ORIENTED EDUCATION

educational processes that support [empathy based learning](#)

EXISTENTIAL SKILLS

“foundational” skills that enable character traits and living strategies, including disposition towards optimism / pessimism, “growth” / “fixed” mindset, level of willpower, health and emotional self-regulation, self-awareness, self-reflection, and self-development abilities, etc.

FUTURE SKILLS

anticipated skills that will be increasingly demanded in our civilization due to wide [automation](#), [digitalization](#), and resulting societal transformation, as well as, in the longer term, gradual shift towards [Thrivability](#) and [Wisdom-based society](#)

GAMIFICATION

application of typical elements of game dynamics (rule-based competition, scoring, etc.) to stimulate and enhance learning experiences.

GLOBAL LEARNING PLATFORM

an integrated set of interactive online services that operates in global online space (i.e. across national & cultural boundaries) and provides educators and learners with tools and resources to support and enhance their learning processes.

GLOCAL

existing at the nexus of global and local processes; influencing, and influenced by, dynamics and factors of both local (national, regional, urban, rural) and global (continental, international, civilizational) level of society.

“HARD” SKILLS

teachable abilities that can be defined and measured, e.g. reading, calculating, tooling.

“INDUSTRIAL” MODEL OF EDUCATION

model of education imitating elements of human “factory” and based on linearity of education processes, conformity of educational content, and batching people into groups for study, based primarily on their age.

LEARNING LIVE CYCLE

full cycle of human beings as learners, from or before birth and until death, that passes through certain biologically and socially defined stages, with stage-specific learning needs and wants present in each stage.

LEARNING PROVIDER

organizer and deliverer of face-to-face or technology-mediated learning experiences

LEARNING SPACE

physical or virtual learning environment that is coordinated / managed by a specific [learning provider](#) (or a group thereof)

LEARNER-CENTERED EDUCATION

model of education that focuses on individual & [collective learner](#) needs across [learning lifecycle](#), served within [glocal educational ecosystems](#)

MARKETPLACE OF LEARNING EXPERIENCES

an electronic mediated “exchange” or “fair” where different providers of formal and informal education and any learning experiences (including companies that invite new employees or interns, or gamers that invite new members of their online video game “clan”) offer these opportunities in exchange for money, time, endorsement and other forms of traditional and “new” currencies

“NEW” EDUCATION

see [learner-centered education](#)

“NEW” CURRENCIES

other than money or financial derivatives, these currencies allow to capture human reputation, creativity, kindness etc. Most experiments with “new” currencies use blockchain technology.

PLAYIFICATION

as opposed to [gamification](#), it is the application of “play” principles and methods to create and enhance learning experiences, including creation and embodiment of imaginary worlds and circumstances, or developing and playing certain roles and characters.

POWER STRUCTURE

system of influence relationships between all individuals (and groups or “constellations” thereof) in a group, community, or organization.

PROTOPIA

desirable yet achievable future state of the society.

PROTOPIA LAB

a space and a community that purposefully experiments with the creation and embodiment of Protopia. One of the main principles of a Protopia Lab is “being the system we want to see in the world”.

REPUTATION CURRENCY OR CAPITAL

accumulated reputation and influence rank (in some cases, tracked and measured by one of the “new” currencies).

SELF-GUIDED LEARNING

comprehensive process of setting goals, defining pace and needs, attracting or creating necessary learning resources and immersing oneself into a variety of learning experiences that holistically develop integral capacities and aspects of one’s personality across the [learning lifecycle](#)

SOFT SKILLS

as opposed to “hard” skills, these are teachable abilities that are desirable yet cannot be fully defined and measured, e.g. ethics, communication skills, etc.

SYNTONY

state of being responsive to, and in harmony with, the environment, or getting in resonance with certain parts of the environment or certain individuals / groups.

THRIVABILITY

generally, it is the intention and practice of aligning organizations or any community of humans, from micro- to macro-scale, with how living systems thrive and how people thrive. In the context of this report, we also define

THRIVABILITY

as the state of our civilization where practices of thriving dominate, and so individuals, communities, and societies can thrive in their present state, in the connection with past and future generations, and in the connection with other species on our planet.

VUCA

abbreviation for Volatile, Uncertain, Complex and Ambiguous situations: a dominant state of the world in the future.

WISDOM BASED SOCIETY

society based on (collective) wisdom for common good, alongside with new models of production & sharing

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