Scenarios for Teaching and Training: From Being "Kodaked" to Futures Literacy and Futures-Proofing[*]

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Abstract

Given the likely reduction if not disappearance of many jobs due to automation, how should educational departments best prepare? Using the Change progression scenario method based on case studies from Australia and Malaysia, four scenarios are developed. In the first future, educators assume youth - high school and university students - will have one job, one career and live in one nation. No change to current educational policy is made. In the second future, through national broadband and 5G networks, the speed of access to information changes, but there is no real change in social infrastructure or in pedagogy. Academic hierarchy continues. Classrooms remain ordered in rows. In the third future, academic institutions learn how to teach and train for the emerging jobs - robotics, care for the aged, for example. Flexibility and adaptability are critical in this future. In the last radical future, teaching and training is for a world where most do not have jobs, where capitalism has ended or has fundamentally changed.

Keywords: *Scenarios, Artificial Intelligence, Jobs, Educational Policy, Teaching, Training*

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1.0 The Challenging Forecasts

A World Development Report "asserts that 68.9% of jobs in India are at high risk - and that number remains at 42.6%, even if adjusted for a lag in technology adoption." (Verick, 2017). In the United States, economists Carl Frey and Michael Osborne concluded 47% of jobs are at high risk of automation (Frey and Osborne, 2013). The International Labour Organization estimates that 137 million workers or 56% of the salaried workforce from Cambodia, Indonesia, the Philippines, Thailand and Vietnam are at great risk of losing employment in the next twenty years (Aravindan & Wong, 2016).

An earlier report by the Foundation for Young Australians provides three dramatic forecasts for 2030 (Brown, 2015). These were:

- *44 per cent of jobs will be automated in the next 10 years*
- *60 per cent of students are chasing careers that won't exist*
- *Young people will have an average of 17 different jobs*

In a similar vein, the World Economic Forum forecasts in its report, The Future of Jobs that five million jobs will disappear because of automation (World Economic Forum, 2016). It is not just factory jobs, but office workers as well as professionals in law and accounting will also be hit. Mckinsey and Company assert that 45% of "today's workplace activities could be done by robots" (Wright, 2016). In Australia, The Committee for Economic Development in Australia argues that 60% of all jobs in rural and regional Australia are at risk by 2030 (Tuffley, 2015). In addition, the International Labour Organization predicts that as Adidas shifts shoe production back to Germany (robots are far more cost competitive than labour) that up to 90% of Southeast Asian workers could face unemployment due to automation (Hoskins, 2016). The former Bank of England Governor, Mark Carney, warned that: "Up to 15 million of the current jobs in Britain" – nearly 50% of 31.8 million workforce - could be replaced by robotics and artificial intelligence over the coming years as livelihoods were 'mercilessly destroyed' by revolutions in technology. He argued that not just administrative, clerical and production staff would be under threat but entire professions such as accounting would likely disappear (Duncan, 2016). Going further, Ruchir Sharma, chief global strategist at Morgan Stanley Investment Management, argues that "before long economists [will] be worrying about a global shortage of robots"(Sharma, 2016). Indeed, recently "speed factories" or robotic factories would be moved back to Asia, that is, as the headline states, "European robots losing jobs to Asian robots as Adidas shifts manufacturing" (Parson, 2020).

While this paper does not factor in the impacts of COVID-19, it seems clear that the pandemic

will hasten the shift to virtual and automated environments. Moreover, growth when it returns is likely to be jobless.

2.0 Back to the 1990s

While forecasts like these are normally reserved for predictive futurists, the dramatic nature of disruption that the world has experienced in the last few decades has made change the norm. If we go back thirty years ago to the early 1990s, a number of significant changes were just commencing that have been instrumental in creating the world we live in today. These included:

1. The fall of the Berlin wall, the breakdown of the Soviet Union and the eventual integration of much of Eastern Europe into the European Union.

2. The beginning of the World Wide Web creating a world where the pivotal issue today is the virtual entering the material world - "leaving the screen", the creation of the internet of things, persons and systems - the full digitization of information and perhaps the realization of the hundred year dream of the H.G.Wells' classic, The World Brain (Wells, 1938).

3. The beginning of the Human Genome Project, creating a world where prevention becomes the norm and every citizen of wealthy nations born in 2025 could receive a full life map of personalized genetic risk factors.

4. The rise of China with the nation moving from a peripheral global economic player - from twenty billion in foreign reserves to nearly four trillion - to the largest economy in the world by some measures (PPP – purchasing power parity) (Investopedia, 2020).

5. The beginning of ageing throughout the Western world and East Asia, leading to a number of issues, including depopulation, with entire European villages for sale for under 100,000 euros, lifelong learning, and the quite dramatic shift from there being enough young people to pay for the pensions of the aged, to there being a lack of young people to pay for pensions (Kassam, 2014 and National Public Radio, 2015). The lack of young people impacts not just the superannuation formula (the worker-retiree ratio) but decreasing enrolments in the education sector, among other factors.

6. The beginning of what we now call international terrorism with the Arab CIA recruits eventually becoming Al-Qaeda, uniting with the Taliban, and further disruptions in Iraq and Syria leading to the rise of Daesh. The result of the inability of finding a geopolitical solution in Syria led to the largest refugee crisis in Europe since World War Two, indeed, calling into question the entire European project. With Russia an active player in the conflict in the Middle

East, we can easily anticipate Afghanistan 2.0. And with the rise of Trump, and the European mini-Trumps, the escalation of global conflict appears inevitable.

7. The 90s also began the great boom - from globalization, from the peace dividend, and from the imagination of the "end of history," of the end of social and political conflict. But history as it has turned out did not end; instead, a global financial crisis in 2007-8 resulted, caused by

>   A. The shift of the world economy to China,
>   B. Disintermediation created by the new digital and robotic technologies,
>   C. The shift from coal and oil to the new renewables,
>   D. Lack of global and national regulation of financial institutions, and,
>   E. Speculative bubbles in housing.

The result for national education policy in many Western nations has been a shift from education as an investment to education as an expense. Governments throughout the world have reduced their expenditures in education, as they deal with increased social security costs (an ageing society) and security costs (from the reality and the imagination of international terrorism) (Inayatullah, 2012).

To deal with the new reality of decreased government subsidies, in 2015, universities found themselves moving toward virtual learning with the intention of having more students with reduced labour costs, and continuing to expand to new areas the emerging markets where the demand for education is insatiable (British Council, 2012). At the same time, to deal with a drop in government funding, the workforce is undergoing casualization, with more being demanded for less (Whyte, 2011). In Australia, "casualization" is now 60 percent of the higher education workforce (Luyt et al., 2008). Comparing the university to the garment industry, Patricia Kelly calls casual lecturers "piece workers of the mind" (Kelly, 2011).

3.0 The Mid-Range Future

These trends are unlikely to stop in the next ten years (EY, n.d.). The number of students enrolled in higher education, for example, is likely to double to 262 million by 2025, with most of the growth in developing nations such as India and China (Maslen, 2012). Over 8 million of these students will travel to other countries (Maslen, 2012). The market size for global education was 2.5 trillion dollars in 2011 (edarabia, 2010) and expected to hit 10 trillion dollars by 2030 (Holon IQ, 2018).

We can thus expect more digitalization and virtualization (and with holograms and virtual

technology) far more high-tech-soft touch experiences. We can also expect the continued globalization of education with providers at high school and university levels coming from all over the world, competing for the student dollar. Major disruptions are likely. Perhaps it will be like Uber, Lyft, Airbnb, Snapgoods (Bercovici, n.d. and the Economist, 2013) and other aspects of the sharing economy, where formal providers - the universities - are disrupted by peer-to-peer app based networks. This means a world where learning is where you want it, when you want it, how you want it, at a cheaper cost, and how you might want to learn the emerging future. Already, we are seeing the advent of predictive avatars and coaches in the Healthcare industry via innovation (Idavatars, n.d.).

Education may also be disrupted by the major players - Alibaba, Google, Facebook - who could offer degree courses not just for employees or training but doctoral courses. Of course, national accreditation remains the barrier. While this barrier may be feudal, the debate in the next ten years will be can it be broken, can the castle walls of the university be broached by the new tech "bedouins"? They may be innovators or barbarians, but the castle will be challenged.

And, youth expect this to be so. Having grown up in a digital environment where the user and connectivity add value, these digital natives are likely to be in positions of executive power throughout the world by 2025-2030. While there are always pendulum shifts to "the good old days" of the industrial era, in 15 years iPads and iPhones will not be considered new technologies, but like chairs and tables, part of the infrastructure, of what is expected (Joy, 2012). Brain-implanted devices will most likely be the norm (Monks, 2014).

However, it is not just youth that are relevant. Alina Tugend (2019) writes of the need for a "60-year" curriculum. As we live longer and will likely need to work longer, the curriculum will need to change. "The 60-year curriculum, which is more an evolving model than a concrete program, is primarily taking shape in the continuing education arm of universities, with the goal of developing a higher education model that is nimbler. It needs to respond quickly to the reality that employees now change jobs and careers many times and that rapidly evolving industries require them to continually learn new skills." Employees, as in the forecasts above, will continue to change jobs, but for 60-80 years.

But what if most jobs are automated? And more significantly, which jobs are least likely to be automated? According to an article by the website Planet Money, "mental health and substance abuse social workers" are least likely to be replaced as the work involves "cleverness, negotiation, and helping others" (Bui, 2015). Elementary school teachers are also extremely unlikely to be roboticized, while librarians have higher than a 50% chance to be automated. However, as digital natives come to power, the odds for automation are likely to increase

(not to mention the pressures from globalization). Moshe Vardi, Director of the Institute for Information Technology at Rice University, asks if we are prepared for "a global economy ...with 50% unemployment (Santini, 2016)." Six to ten percent of American jobs will disappear due to driverless cars, to begin with. And as automation spreads through the entire economic system, no profession will be safe (Santini, 2016). Indeed, car ownership will likely shift to a culture of mobility - an integrated network of travel options (Kosoff, 2016). Traditional car companies focused on selling the car as product will find themselves severely challenged. The innovation will be creating and selling mobility options.

However, the above analysis assumes a straight-line trend projection, but as there are many uncertainties with respect to the growth of artificial intelligence and our educational response, we need to explore not the future, but alternative futures.

This has been made painfully clear with the COVID-19 pandemic, with many universities facing severe shortfalls in budgets (The Conversation, 2020). In Malaysia, Hunter (2020) argues that "an imminent collapse is pending within Malaysia's private higher education sector that could potentially permanently close the doors to up to half of the country's private institutions, leaving only a few with strong backers to financially guarantee their survival." While it is beyond the terms of this paper to articulate COVID- 19 implications for higher education, suffice to say that the pandemic (Inayatullah and Black, 2020) is likely to be followed by other disruptions: new pandemics, financial shocks and climate change. Teaching and learning thus need to embrace innovation and articulate scenarios. Moving to online platforms is likely to be enhanced because of lockdowns. Already, it is estimated that the global 5G market will reach 45.96 billion by 2030, growing annually over 2020-2030 (Bezinga, 2020). Thus, COVID-19 dramatically exacerbates these trends, the further casualization of the university as international students are forced to return home and the virtualization of teaching.

This paper uses Australia and Malaysia as case studies to develop scenarios. The Australian scenarios were developed for Queensland Association of State School Principals (Inayatullah, 2016). In the Change progression scenario method, four futures are presented: the "No Change", the Marginal Change, the Adaptive Change and the Radical Change. The Malaysian scenarios for the Ministry of Higher Education were developed before as part of a book on the futures of Malaysian Universities (Inayatullah and Ithinin, 2018). The method focuses not just on how the world is changing, but how individuals and institutions can or should react to the changing future. It is developed from the Futures Triangle (Inayatullah, 2008) via insights by Ivana Milojevic (2002).

4.0 Alternative Futures

Four scenarios are possible.

	NO CHANGE	MARGINAL CHANGE	ADAPTIVE CHANGE	RADICAL CHANGE
Scenario title	Teach and Train for the 1950s.	Teach and Train for incremental change.	Teach and Train for emerging industries.	Teach and Train for a world after most jobs.
Systemic change	No curriculum change.	Minor curriculum change.	Focus on emerging futures - major curriculum change.	Focus on meaning and purpose with multiple forms of intelligence.
Worldview	The Industrial era continues.	Muddling through.	Forecast and Adapt.	After Capitalism.
Core myth/metaphor	"Teaching for jobs that no longer exist"	"Too little, too late."	"How well do you get along with your green robot?"	"Strangers in a strange land."
Consequence	Kodaked	Drowning	Future-ready	Futures-proof

4.1 Teach and Train for the 1950s

In this future, educators assume youth - high school and university students - will have one job, one career and live in one nation. Focused on the past successes and mired down by party politics, Australia, for example, is unable to shift to a post-industrial economy. Already Australia is ranked a lowly 48 for average internet speed and 60 during peak periods (Lui, 2016). For students and teachers, it will be like living in a prison cell (wasting their time, and when they are free, they will be irrelevant). As the economy shifts, large sectors will disappear. The story line would be: "teaching for jobs that no longer exist." As William Bossert, a Harvard Professor who taught computer sciences in the 1970s, recently commented: "If you're afraid that you might be replaced by a computer, then you probably can be and should be" (Colvin, 2015). Dystopian images of the "last job on Earth" and riots against the new technologies are likely (Riley & Paddison, 2016). However, it is worthwhile remembering that prior to the alarm clock, "knocker-uppers" woke up factory workers by banging on bedroom windows. Transitions to new economic eras are fraught with challenges. Transitional strategies are crucial. There are

clear implications in this future. If national educational systems do not challenge traditional models of pedagogy, they will fall behind. This is true between nations and within nations as well. Over time, this will create a dramatic two class system: those who are future-ready and those hoping for the past to return. They will have been "Kodaked."

4.2 Teach and Train for Incremental Change

In this future, through national broadband networks, the speed of access to information changes, but there is no real change in social infrastructure. Academic hierarchy continues. Classrooms remain ordered in rows. Knowledge is about repeating information. The story line would be: "too little, too late". For students, they will face a disconnect between virtual world/peer-to-peer networks and the formal industrial educational system. They will be physically in class, but mentally far away. This marginal change scenario, while likely to continue, is being challenged by COVID-19. The lockdown caused by the pandemic is forcing educational institutions to shift. Marginal change when the rate of change is steady can be an acceptable strategy. But if the river current is quick, and one does not keep up, then drowning is likely to result. While most educational systems are slow to adapt, this scenario suggests that as technological innovation continues and as events like COVID-19 force virtualization then finding ways to match skills with emerging jobs is crucial.

4.3 Teach and Train for Emerging Industries

In this future, high schools and universities, indeed, the entire educational system, teaches for current emerging futures. Retraining is crucial as it was in the shift from agriculture to industrial. For example, farming throughout the developed world was once the largest labour source. In the USA, technological advancements in farming have reduced labour from "10 million in 1950 to 3 million in 2010" (Hiner, 2015). "Similarly, back in 1901, 200,000 of England and Wales's 32.5 million people were employed in the clothes-washing business, and by 2011, just 35,000 in a population of 56.1 million are flying the launderers' flag" (Crew, 2015).

We are in the midst of a similar structural change to the next economic revolution. The curriculum will likely be focused on the following areas (Moran, 2016):

- Robotics and artificial intelligence in all products and processes
- Bio-informatics
- Peer to peer economics
- Care for ageing
- Meditation and emotional intelligence

- Software design, including the software of food
- City design
- 3d printing - local manufacturing
- The internet of everything
- Solar and wind energy, including smart houses and cities

Teaching will be focused on preparing futures not just for the new jobs, but in a world where many traditional jobs will disappear. The focus will be on teaching flexibility as some students will have portfolio careers - what they can do, not positions held - and multiple careers (changing careers every few years). Some will stay focused in one area, but many will wander innovating to create new types of work. Technology will create new categories of jobs, some unimaginable through today's lenses.

Students find their needs met, they are excited about education and blend easily between formal high school and university and their own virtual peer to peer learning frameworks. The value added is not problem solving as computers can do that with ease, but with defining the problem and with being alert to how the nature of the problem keeps on shifting, that is, we are embedded in complex adaptive systems that change as we intervene in the system, as we solve the problem. Indeed, Ruchir Sharma argues that with the rise of robots, we will soon likely learn to "treasure our robots" (Sharma, 2016). Indeed, in nations such as Germany, Japan and South Korea that are already employing robots, the job picture is strong, that is, roboticization will create new types of work (Sharma, 2016). The ability to use, live with, understand, co-evolved with new emergent technologies will be a critical competitive advantage in this future. A tag line for this future could be: "How well do you get along with your green robot?"

For nations, adapting to this future not only ensures competitive advantage, but reduces social unrest. Students are learning to develop skills that the economic system needs. They are becoming futures literate. However, this strategy requires consultation with all stakeholders to succeed. Parents, ministry bureaucrats, educational administrators and leaders will need to see the benefits of innovation. A dramatic change in narrative might be necessary. In the Philippines, for example, we reported on a workshop where senior leaders believed that adaptive change meant tearing down the system. As we wrote (Inayatullah, 2020: 4):

> During a workshop for national government officers in the Philippines focused on redoing the K-12 educational system, there was a desire to shift the metaphor from "walls - too many bricks come between us" to "wrecking ball." Participants asserted that the current system was focused on conformity with walls between technology, nature and the environment. It focused on conformity, keeping students protected from new ideas,

from others - it was isolating. A new system was needed that could embrace creativity and innovation. Only a "wrecking ball" they believed could do that. Marginal change or a reformist agenda would not succeed, given the tensions that exist between the reality of the educational system, and the emerging future.

Thus, while adapting to the changing world is a necessity, the question remains: can educational systems do so? The fourth future is even more radical and imagines a world after jobs.

4.4 Teach and Train for a World After Most Jobs

This future takes forecasts for the end of jobs seriously, concluding that the emerging efficient, collaborative and sharing economy will likely dominate by 2030. Robotics, the internet of everything and major disruptions will make education no longer about jobs but about purpose, adaptability and meaning.

Students at Edmund Rice Education Australia suggested that for them in this scenario, education would become a matching system, the "tinder of education." They would have access to smart global platforms that would allow them to choose educators. Suppliers could be local or global, on-line or face to face (Inayatullah, 2020).

Techno-optimists argue that smart machines will dramatically economic surplus so "that we could collectively afford to liberate much of humanity from both labour and suffering (Lim, 2016)." With labour transformed, knowledge passing on between generations will not be data based but about the sharing of emotional, spiritual and new forms of intelligence. Says Meg Bear, former Vice-president of Oracle, "Empathy is the critical 21st-century skill" (Colvin, 2015). Indeed, the main issue will be: "how well do you get along with your robot?" (Fisher, 2015). As AI is best suited for standardized work, performance is not about being like a "lean machine," but "good at being a person. Great performance requires us to be intensely human beings," argues Geoff Colvin in his new book, Humans are Underrated. Value comes from the ability "to build relationships, brainstorm, collaborate, and lead" (Colvin, 2015). The shift would not just be from the current corporate model to the sharing economy - Uber - but creating platform cooperativism where drivers own the business - cooperation. Productivity will likely be higher as there is enhanced buy-in. So, it is not really the "gig" economy as many argue (a recent report suggests that 40% of U.S. workers will be independent contractors or freelancers by 2020), but a true cooperative economy (Neuner, 2013). Of course, with dis-intermediation, some sectors will likely be run by large state or corporate actors who can control because of the economies of scale. But the boom will be in platforms that create new value through cooperation. This leads to greater equity and productivity. Well-being can potentially result.

Ideally, in this future we shift from teaching and learning for GDP to a more balanced world where we are focused on prosperity, the planet, people, and purpose.

This scenario essentially is long-term oriented. For most educational systems, designed to produce workers and now talent for jobs, a world generally after jobs is too difficult to contemplate. However, it is essential to do as, even if this future does not result, the act of imagining a radically different type of world helps us prepare for novelty. It truly future-proofs us. Certainly, part of education needs to remain about the larger purpose of civilization, not just national and global competition.

4.5 Breaching the Castle

However, if we are not careful inequality could spike even more, where the owners of robots accrue all the profits and the rest live in a state of fear and despair - perpetual job anxiety (Wright, 2016). Safety and security is a must. This can emerge from a basic universal income (BIEN, n.d.). This ensures that survival is taken care of so that individuals can focus on "thrival". Already, a number of countries are experiments with this approach: for example, in 2017 Finland became the first European country to trial the application of a UBI (Worstall, 2015). This is a guaranteed and unconditional payment made to all adult citizens to allow them to meet their basic needs. This income was not activity or means tested – with unemployed Finns receiving a guaranteed payment per month for two years, paid even if they find work during that period (Samuels, 2017). The nation decided not to continue the trial with the evaluation suggesting that participants were happier - less stressed - but jobs did not result. (BBC, 2019).

Since 2017, two cities in Ontario, Canada, have been trialling basic income. One group receives a basic income and another does not. Barcelona has also been trialling UBI since October 2017. Again, one group of 1000 receives income and the second does not. Scotland will provide 250,000 pounds for a trial as well (Reynolds, 2018). American presidential candidate Andrew Yang called for a UBI of 1000 US$ for each American citizen during his campaign run (Darrough, 2019).

If developments in robotics continue and universal basic income becomes the planetary norm, it would be a post-scarcity world, where current - 2020 - way of acting and being would be disadvantageous. The tag line for this scenario is: "strangers in a strange land".

Students will find this world both exciting and threatening. Exciting as it opens up many possibilities, but threatening in that they will need to adjust to and create new forms of physical and knowledge infrastructure. The future will be truly unknown.

Education would have been disrupted in this scenario. The castle would have been breached. The knights - the professors - could go back to what they truly love - reflecting, learning, teaching and the creation of new knowledge. One possibility is the elimination of a large percentage of academics, especially for those universities reliant on foreign students or unable to compete with the global market for students.

As the factory disappears, could education become a digital ecological playground? Perhaps. But once the moat disappears down, it is unclear what will emerge afterwards. Perhaps the villagers outside the castle walls may storm inside, or perhaps they will welcome the new global brain?

4.6 Malaysia and Brunei

When the neighbouring government of Malaysia went through a similar process - though focused on the delivery of education - they concluded the following (Ministry of Higher Education, Government of Malaysia, 2018). In the no change scenario, accreditation is foundational. The assumption of one job and one career continues. In the long run, universities are not sustainable as they do not respond to the changing world. In the marginal change scenario, there is some flexibility and students can choose courses and educational programmes from various Malaysian universities. This is the "jukebox" model of education. Educational suppliers - teachers and universities - thus shift depending on whether their music - knowledge products - are regularly picked. It is a dynamic economic and learning model. In the adaptive scenario, education is cost effective as learning platforms are used. Education is delivered on demand, self-tailored, highly accessible and convenient. "The focus of this model is flexible education which promotes lifelong learning (Ministry of Higher Education, Government of Malaysia, 2018: 63). The guiding narrative is the "Uberized University." Designing and maintaining the platform becomes the critical learning task. The issue will be who owns the platform - the State, large private AI companies, or will it be peer-to-peer owned, that is, a platform cooperative? In the Radical scenario, instead of Uber as the guiding narrative, it is nano and micro certification. Thus, accreditation continues, but it is stackable, given by thousands of providers instead of one official degree. The Ministry along with social networks (the Trip-Advisor model) ensure standards and excellence; however, it is the individual student who collects these credits over a lifetime. Industry acknowledges and respects these credits. In this future, the job is not central but learning and the ability to show mastery over particular skills.

For Brunei, as a wealthy small nation, flexibility is possible. It could invest in young people, platform cooperatives, peer to peer learning, and see itself as, if not a global player in education and learning, at least a leader in the region. For this to occur, the old worldview of education

as a factory needs to be challenged. The factory needs to be transformed into an alternative narrative. In high schools in Australia, for example, they discussed moving from the suit bought off the rack, that is, one size fits all, to the tailor-made suit. Thus, the narrative suggests flexibility, seeing the student at the centre and designing educational pathways for his and her personal and economic life journey.

For Brunei, as well, given the argument made here that incremental change is unlikely to suffice in the educational challenges ahead, it is crucial to articulate a shared vision of education, create new narratives that allow the new vision to flourish, and insist on systemic changes - how education is taught, when it is taught, through which media, and by whom. The radical future may fit well for Brunei as it is already focused not just on external measurements of success, but inner measurements, thus inner and outer well-being may be worthy goals for its educational sector. The radical scenario in the Malaysian micro-certification model would also fit the social nature of Brunei society. Education would thus be a collective effort.

What is clear, is that believing that tomorrow will be like today is a precursor to obsolescence. The no change scenario means going backward while the rest of the planet transforms. The marginal change is likely to mean drowning as the speed of the river of change increases. The adaptive change scenario means futures literacy. Finally, the radical change scenario means being truly futures-proof.

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