Future-ready Learners: Learning, Lifework, Living, and Habits of Practices

Executive Summary: Future-ready Learners Framework

Academic Quality
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Executive Summary

Future-ready Learners Framework

Fundamental shifts in the economy, social, and environment at the global, regional, and national levels are redefining how we work, live, and learn in Singapore. For example, rapid technological advancements globally are reshaping business models where organizations compete on intangible assets such as intellectual property, data and user networks. With religious extremism and terrorism on the rise globally, Singapore faces the challenge of maintaining peace and harmony in its religious diverse society. On the environmental front, Singapore needs to balance its urbanization need for resources and create sustainable practices to reduce carbon footprint and mitigate climate change effects.

All these challenges have fundamental implications on the readiness of our education system in enabling our learners to actively co-create the future of our environment, society, and the economy together with the government.

In this framework, we propose to substitute the concept of students with learners. The concept of students is tied to a fixed period of study. But the concept of learners suggests lifelong learning. Humans (Singaporeans) will continue to learn, unlearn, and relearn throughout their entire life. All these challenges have fundamental implications for education in Singapore.

- How do we develop "future-ready" learners who will co-create living, lifework, and learning in Singapore?

We have proposed the following definition of a successful education system:

A successful education system is able to develop future-ready individuals who will continue to learn beyond graduation, take on future lifework, and thrive in a changing society and environment (Ng, 2019).

The framework consists of the following dimensions that provide an integrated approach to **define successful education and future-ready learner outcomes**:

- Dimension 1: Purposes of schooling (Development for life-long learning, lifework, and living)
- Dimension 2: Time (Past, present, and future)
- Dimension 3: Contexts (Economics, Social, Environmental – *technological is integral in all the three primary contexts*).
- Dimension 4: Practices[1] (Teaching and learning practices, community practices, school leadership and management practices, inquiry practices)

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[1] The author has written and published book chapters and articles of complexity learning as an alternative method of learning, leadership and management practices, and research methods on complexity)

Dimension 1 Purpose of schooling: Future-ready Learning (Preparing future-ready Learners)

How do future-ready Singaporeans co-create learning opportunities and actively participate in life-long learning?

The recent Committee on the Future Economy (2017) report reiterates the government's hopes of developing a nation of life-long learners, who embrace learning as part of life. Synthesis from recent literature on learning highlight the imperative that future-ready learners must embrace and practice the following concepts of learning:

- Life-long learning
  Formal continuous learning to stay relevant throughout the individual's entire work life and beyond.
- Life-wide learning
  Informal learning that takes place and cuts across multiple contexts in a person's life that allow for multiple expertise development while simultaneously support identity development. It includes leveraging on physical and virtual networks for learning.
- Life-deep learning
  Deep mastery of multiple disciplines, adaptive expertise, and values (religious, moral, ethical) formation.

Dimension 1 Purpose of schooling: Future-ready for Lifework (Preparing future-ready learners for the future economy)

How do future-ready Singaporeans shape the future of work and co-create future lifework?

Lifework is defined as the entire or principal work or activity of a person's lifetime. The confluence of rapid technology advancements together with the economic, social, and environmental changes bring about unprecedented challenges and opportunities for Singapore. The Committee on the Future Economy (2016, 2017) identified key strategies for developing Singapore's economy that will have deep implications on the lifework of Singaporeans. Future-ready for lifework will require the individual to:

• Adopt new technologies and innovation
• Deepen competencies that will be needed in high value manufacturing and high value service jobs
• Value creation (beyond value-added). Value creation introduces newness of products, services, and processes that expand the scope for human purposes.
• Skills mastery
• Innovative and creative mindset

Future-ready for lifework will require taking a long-term view of learning. Learning for the immediate often focus on facts and meeting standards. The long-term view of learning that will prepare the individual for the future of lifework will require cultivating a passion for learning, inquisitive mind, accept failure as part of learning, experimenting and others. These are new habits of practices that are automatically executed without being told.

Dimension 1 Purpose of schooling: Future-ready Living (Preparing future-ready learners for society and sustainable living)

How do Singaporeans contribute to a cohesive society and co-create sustainable utilization of earth's resources?

Future-ready for living includes citizenry (social) and sustainable utilization of resources (environment). Social integration and cohesion are critical for maintaining harmony and enable citizens to thrive on learning and lifework. The principles of multiculturalism, secularism, and meritocracy will continue to be vital to provide the foundations of social harmony. The heartware that individuals must develop for future-ready living in Singapore's context will include:

• Tolerance	• Mutual understanding
• Mutual respect	• Inter-cultural communication skills
• Rootedness	• Inclusivity
• Information assessment literacy (discern factual and fake news)	

As Singapore progresses into the future, greater sustainable consumption of energy (electricity, electromagnetic spectrum, sunlight) and matter (food, water, physical infrastructures etc.) will inevitably follow. Without a sustainable and liveable environment, there will be no place to support future economic development or to live harmoniously. Future-ready for living will require learners to contribute to a greener and sustainable management of resources. Future-ready for living will require:

• Skills mastery	• Innovation
• Value creation	• Technology adoption
• Digitalization	• Creative thinking
• Sustainable lifestyle	

Dimensions 2 and 3: What is Singapore's future economic, social, and environmental trajectory?

We have done an extensive synthesis of literature, global, and national contexts to map out the trajectory of Singapore's future. The following table summarizes the trajectory of Singapore's economic, social and environmental contexts and the skills, knowledge and values required of individuals for the anticipated future.

Context	Trajectory	Skills, Knowledge, Values
Economic	• High value manufacturing • New and novel services (High-tech services requiring IoT, blockchain etc.) • Commercialization of innovative solutions • Competitive advantage through purposeful and radical adoption of technology and digitalization in services and manufacturing	• Skills mastery • Life-long, life-wide, and life-deep learning • Innovation • Value creation • Technology adoption • Digitalization • Creative thinking
Social	• Increased religiosity: the threat of religious extremism	• Tolerance • Mutual understanding • Mutual respect

	• Increased immigration: the need for integration and acceptance of newcomers • Racial issues: the need for racial harmony • Aging population: the need for continuous education • Misinformation and influence of social media platforms	• Inter-cultural communication skills • Logical reasoning skills • Critical thinking • Rootedness • Inclusivity • Information assessment literacy • Life-deep learning
Environmental	• Increased urbanization: increased consumption of energy and matter • Global environmental problems: the need for reducing carbon footprint • Renewable energy • Energy efficiency through green and innovative solutions • High-tech water solutions for meeting the increasing water needs • High-tech and green farms for increasing local food produce	• Skills mastery • Innovation • Value creation • Technology adoption • Digitalization • Creative thinking • Sustainable lifestyle

Table: Summary of Singapore's Contexts and Future Skills, Knowledge, and Values

Dimension 4: Practices - What system-wide practices are needed to prepare future-ready learners?

Habits of Practice Required of Learners for Singapore's Future Landscape

Having identified the future trajectory of Singapore's future, the next important question to address in the framework is the Practice Dimension. (Dimension 4).

What habits of practice must learners in the school system need in order to co-create and shape the future of Singapore?

Future-ready learners will require changing teaching and learning practices and the creation of learning environments that will nurture, develop, and enable development of competencies and habits of practices. The Ministry of Education has provided a framework for competencies required of students for the 21st century to help them thrive in the changing landscape of Singapore (Ministry of Education, 2018).

In this framework we introduce a complementary dimension to the framework for competencies – habits of practices. Competencies include values, knowledge, and skills. Habit of practice is defined as *readiness to practice or execute certain behaviours without being told.* These habits of practices are behaviours that are repeated in response to changing situations or when faced with uncertainties, challenges, and unprecedented encounters. Both competencies and habits of practices are crucial for being future ready. Habits of practices must be supported by competencies. Below is a summary table of future-ready outcomes that are associated with habits of practices:

Habit	Practices	Habits of practices associated with future-ready learning, lifework, and living

1. Inquisitiveness	• Ask various kinds of questions to self and others (higher order questions, metacognitive questions etc.), which helps individuals make meaning, reflect and learn • Being curious	• Mastery of learning • Life-long, life-wide, life-deep learning • Innovation • Creative thinking
2. Ideation	• Respond to stimulus and context-dependent and can be through serendipity • Requires understanding of assumptions of practices and paradigms • Define, clarify, and reframe problems • Challenges the status quo • Adopt a wide repertoire of approaches to ideation that leverages on physical and virtual networks • Adopt analytics to answer big questions	• Innovation • Creative thinking • Critical thinking • Value creation • Mastery of learning • Technology adoption • Networks
3. Prototyping	• Translate ideas into action • Evaluate, verify and communicate ideas and possibilities • Allows iteration for feedback – learning from failures • Test possibilities, challenges, and potential spin offs	• Innovation • Creative thinking • Value creation • Technology adoption • Digitalization • Critical thinking • Logical reasoning skills
4. Entrepreneurship	• Seeks opportunities and pieces together information that were previously unconnected • Commitment tolerance • Pursue opportunities • Propose future value • Develops new products and services that capture new markets/users • Creates new uses • Occurs in a stimulating environment where diversity, multi-cultural, and differences exist	• Inter-cultural communication skills • Value creation • Technology adoption • Innovation • Digitalization • Critical thinking • Networks
5. Intercultural acumen	• Accepts diversity of values, ethnicity, and religions • Manage conflicts and seek optimal solutions • Cultivate networks of collaboration and deepen ties and friendship • Decipher false information from real in a digitalized landscape	• Inter-cultural communication • Tolerance • Mutual understanding • Mutual respect • Logical reasoning skills • Critical thinking • Rootedness • Information assessment literacy
6. Passion	• Full immersion in activity and persist in the face of obstacles • The passionate activity becomes part of a person's identity • Finds meaning and purpose in the activity • Accepts failure as part of learning	• Mastery of learning • Life-long, life-wide, life-deep learning • Innovation

Successful education needs to fulfil all its three purposes, with a keen awareness of the future perspective of time. Future-ready learners will need to develop deep competencies and cultivate habits of practices that will continue to be valuable long after graduation as the future landscapes of Singapore continue to evolve and change.

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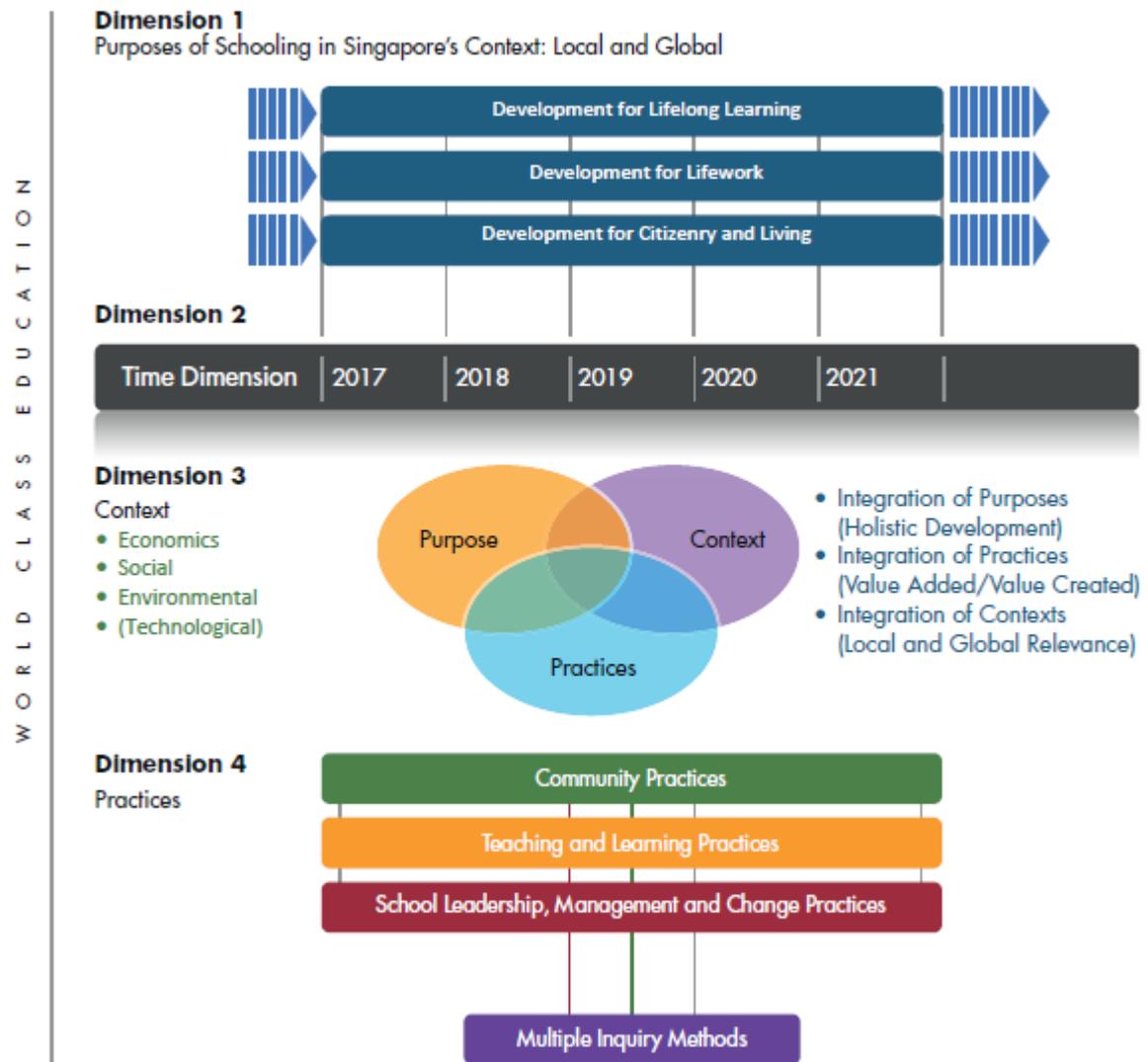Nanyang Technological University, Singapore

Annex 1:

Figure 1: Multi-dimension framework for educational success (Ng, 2019)

Annex 2:Expert Reviews, Presentation, Adoption, and Publications

1.	**Anthony Mackay** CEO and President of the Washington DC based National Center on Education and the Economy. Chair of the Australian Council for Educational Research, Deputy Chancellor Swinburne University, Melbourne and Deputy Chair of New Zealand's Education Council 4 Sep 2019	Framework is highly relevant, strategic, and useful. It is at the forefront of international thought leadership It is a conceptually robust framework reflecting and informed by – but going beyond – a growing body of international work in this field Having established the purposes of schooling (learning/working/living) & the vital significance of time (past/present/future) the Framework makes clear the crucial importance of contexts (economic / social / environmental) and the integral role of technology in each context. The analysis is powerful & persuasive. Proposed additional points to be considered to strengthen the framework: Learning Sciences, AI, and Learner agency"
2.	**Philip Hallinger** TSDF Chair Professor of Leadership College of Management, Mahidol University Thailand 1 Dec 2019	…it produced a new, original and significant contribution to our thinking about the role of education in lifelong learning for innovation and sustainability. I appreciated the way that you synthesized knowledge from the sustainability, innovation and human learning literatures. It is very mature work of which you should be very proud. I found that your conceptualization is very consistent with Singapore's aspirations of producing thought leadership. (see details in Annex)
3.	**George Siemens** Professor and the Executive Director of the Learning Innovation and Networked Knowledge Research Lab at University of Texas, Arlington and cross-appointed with the Centre for Distance Education at Athabasca University. NIE 14th CJ Koh Professor, Professor and Director, Centre for Change and Complexity in Learning at the University of South Australia 12 Oct 2019	The framework is a solid and complete model to understanding both learning and the settings in which it happens. The emphasis on understanding the context of learning is particularly useful. Each of the dimensions capture an aspect of the learning process and the integrated way in which the overall model operates will have an impact in raising student performance. My only suggestion is build in specific practices to listen to what the data says about the performance of the model as a whole. Where you start won't be as important as where you end up. When you build in processes and practices of capturing and evaluating data, you'll have a way to guide subsequent iterations.
4.	**Ken Leithwood** Professor Emeritus, University of Toronto	I read the two pieces you sent me. Very impressive work. Congratulations. No doubt many jurisdictions will want to build on this for their own purposes.

		5 Sep 2019	

5.	**Jennifer Davies**
	Dean, Association of Independent Schools (AIS) Leadership Centre New South Wales, Australia
	
	11 Sep 2019
		I am drawn to David's summary of the skills, knowledge and values required for future ready leadership which appear consistent across countries, together with his aspirational and erudite paper *"Defining educational success: The time continuum for leadership learning"* (2019).
		…I would share with you an outcome of your paper in helping our team forge a new direction for the way forward with our work *(programs)*.
		    This involves the commencement of a future focused strategic initiative – an 11 month strategically aligned project focused on preparing future ready leaders for future ready learners. In preparing aspirant principals to do this work we:
		  - build the narrative about the purposes of schooling, that is sensitive to context at a local and global level, aware of time and proportioning learning against this continuum to enable to purpose of schooling to be accomplished.
		  - lead the development of their future focused strategic initiative (FFSI) through collaborative, agile processes using innovation methodology –
		in particular, the Theory of Change, presented to us by from the Innovation Unit UK.

	Global Ed Talk National Center on Education and the Economy, Washington DC, USA. 18 Oct 2919	Interview: In this Global Ed Talks interview, Anthony Mackay sits down with David Ng, associate professor and head of academic quality at the National Institute of Education (NIE) in Singapore, to discuss leadership learning and leadership development for a successful education system. Ng defines a successful education system as one that is able to graduate students who are future-ready, meaning they are able to thrive in a changing society and environment, take on future life work and continue to learn beyond graduation. http://ncee.org/2019/10/global-ed-talks-david-ng/ An inside look at Singapore's Education System Building the Nation Builders: How Singapore Supports Its World-Class Teaching Profession features the voices of the teachers and leaders who propel Singapore's world-class education system forward. Their perspectives provide new texture

		and understanding of how to foster successful teaching and learning and at the same time build rewarding and desirable career trajectories for the professionals that make it all possible. http://ncee.org/2019/10/building-the-nation-builders/
7.	**International Leadership Centres**	Future-ready Learners' framework has been adopted by International Educational Leadership Centres (IELC) for redesigning educational leadership programmes IELC includes: NCEE (USA), Bastow Institute (Australia), Three Nations Leadership Network (Scotland, Ireland, Wales), AISNSW Leadership Institute (New South Wales), Ontario Principals' Council (Canada), New Zealand Teaching Council, Australia Institute for Teaching and School Leadership, Hong Kong. The concepts related to the above framework and my work on complexity learning were part of a common set of agenda accepted by a network of International Educational Leadership Centres. The agenda includes: • Complexity • Future ready learners • Future ready leaders • Future ready learning organizations • Enabling environments mediating leaders • Future ready leadership learning
8.	**Toby Greany** Professor of Education School of Education University of Nottingham UK 12 Mar 2020	I think it is excellent. Several of the earlier reviewers noted the sophistication with which you ground your analysis in the current context of Singapore, and the economic, demographic, socio-cultural, and environmental challenges that it faces today and in the future. I would agree that this analysis is very strong – though I can also see how universal many of these issues are, even if they play out somewhat differently in different national contexts. This means that I also see huge value in your assessment of the learning and educational opportunities that Singapore faces – since so many of these are also universal. The framework itself is cogent and persuasive – I particularly like the way in which the six habits are articulated and related back to the concept of lifelong, life-wide, and life-deep learning. One of the strengths of the habits approach you adopt is

that it is possible to glimpse how they could be developed and applied in the context of formal education – so your work on a machine learning approach to assessment is particularly exciting – I look forward to hearing more!

A few thoughts on areas where I had questions:

- Leadership and agency – several of the habits could be seen as geared towards developing individual agency (through passion, entrepreneurial skills etc), but the need for developing such agency among the young people of today is not drawn out as much it could be. I would argue that such agency is critical in a time when societies are arguably becoming more atomised and individuals can so often feel powerless to effect change. This has important implication for how educators might need to reconceptualise their own roles – for example, Annelies can say more about the work she is doing in NZ on developing student leadership.

- Technology – you say a lot about this, and your points on fake news etc are very strong. One area I am interested in is the extent to which the amount of time that young people spend online is increasing exponentially across PISA nations. As yet we don't know enough about how this relates to areas such as mental well-being and the development of interpersonal skills, but I am certainly trying to develop the habit of self-regulation in this area in my own children!

- Finally, I like your section on mastery, but I wondered how you see this fitting with the need for specialist knowledge, skills and expertise in specific subject areas? Here in England there is a strong neo-trad movement away from 21st century skills and towards traditional subject teaching and disciplines, with a parallel push for schools to be more explicit about their curriculum intent/design. The drivers of this are partly the same as yours – a rejection of assessment outcomes as the be all and end all of education, but the direction of travel is obviously very different. I am struck how often parents/the media/wider public have also rejected efforts to develop 21st century skills approaches (eg in Netherlands, Canada etc). Where do you see all this fitting?

Publication: Book chapter and journals

1.	Ng, D. F. S. (2019). Future-Ready Leadership Development. In Instructional Leadership and Leadership for Learning in Schools (pp. 165-192). Palgrave Macmillan, Cham.
2.	Ng, D. F. S. (2019). Defining educational success: The time continuum for leadership learning. Seminar Series 285 Centre for Strategic Education (CSE)
3.	Ng, D. F. S. & Wong, C. P. (accepted for publication Spring 2020). Future-ready School Reform in Singapore. European Journal of Education.