

Chapter 7

Resilience and Growth: A University's Response for Future-Proofing Graduates and Careers



Miriam Jacqueline Green, Erik Johan Hertzman, and McRhon Banderlipe

Abbreviations

| | |
|-------|---|
| AYCL | all you can learn |
| CET | continuing education and training |
| CFG | Centre for Future-Ready Graduates |
| DYOM | design your own module |
| L3 | Lifelong Learners program |
| NOC | NUS Overseas Colleges |
| NUS | National University of Singapore |
| R&G | Resiliency and Growth Initiative |
| SCALE | School of Continuing and Lifelong Education |

7.1 Introduction

With a population of around 5.6 million, Singapore is affectionately referred to as the “little red dot” because of the way it is represented on many maps. Singapore became an independent country in 1965 and has an open and stable economy focused on manufacturing, trade, and business and financial services. Singapore’s highly

M. J. Green (✉) · E. J. Hertzman · M. Banderlipe
National University of Singapore, Singapore, Singapore
e-mail: pvomjg@nus.edu.sg

E. J. Hertzman
e-mail: ehertzman@nus.edu.sg

M. Banderlipe
e-mail: mcrhon@nus.edu.sg

automated port is one of the busiest in the world. As a small nation integrated into and dependent on the international economy, Singapore has achieved remarkable success. Life expectancy, literacy, and gross domestic product (GDP) per capita are all among the highest in the world.¹ Without natural resources to drive economic growth, Singapore has stressed the need for education and human capital development since gaining independence. Singapore's education system produced 8,000 polytechnic and university graduates in 1985, rising to 25,800 in 2007.² By the early 2010s, investment in education had reached an average of 26.9% of total annual government expenditures, and in 2018 the gross tertiary education enrollment ratio stood at 88.9%.³

According to the Agency for Science, Technology and Research (2019), Singapore's transformation to a knowledge-based economy requires significant investments in expanding research, innovation, and enterprise activities—pillars that are essential to sustain the country's long-term economic growth. In 2018, national expenditure on research and development investments reached S\$9.3 billion (US\$6.8 billion⁴), impacting 49,704 jobs and inviting more collaboration among universities and research institutes, as well as the public and private sectors (National Research Foundation, Agency for Science, Technology and Research 2018).

Singapore has recognized the need for its workforce to be able to adapt and respond to the ways in which globalization and technology have changed the economy and work. Government, private industry, and educational institutions work together to secure the country's future. One of the ways Singapore has done this is through SkillsFuture. This framework helps to ensure that individuals are given opportunities to acquire the skills necessary for successful careers and career changes, and that industries have a steady pipeline of highly qualified talent.

7.2 The National University of Singapore

Started as a medical school in 1905, the National University of Singapore (NUS) is an active player in creating and harnessing knowledge to contribute to national development and progress. Singapore's open economy and multiracial society propelled NUS to embrace internationalization, and to adopt globalized curricula and

¹Singapore's life expectancy in 2019 was 83.6 years, compared to Asia (73.6), Europe and North America (78.7), and high-income countries (81); see UN-DESA (2019) for details. The literacy rate is 97%, compared to 86.3% for the world. Mean years of schooling in Singapore has risen from 8.2 in 1999, to 9.7 in 2009, and to 11.2 years in 2019; refer to World Bank (2020). GDP per capita was over US\$65,000 in 2019, slightly higher than that of the United States (Department of Statistics Singapore 2019).

²In 1980, only a quarter of Singaporeans aged 25–39 years had completed secondary education and above. This jumped to 96% by 2010 (Gopinathan 2015).

³Education expenditures during the same period averaged 3.0% of GDP; see UNESCO Institute of Statistics (2020).

⁴S\$1 = US\$0.73 as of 31 December 2018.

learning experiences that can compete with top-tier universities around the world. This has resulted in a number of important academic collaborations for NUS in recent years: the Duke–NUS Medical School in 2005, and Yale–NUS College in 2011.

Most importantly, these collaborations and networks have contributed to NUS' global acceptance and recognition. NUS currently ranks 1st in Asia and 11th globally in the 2021 QS World University Rankings.⁵ Significantly, NUS graduates have gone on to become outstanding members of the political, legal, business, social and artistic communities in Singapore and beyond.⁶

7.2.1 *The NUS Mission*

The National University of Singapore strives to be a leading university, not only in Asia, but in the world (see Box 7.1). Its high-impact research advances the boundaries of knowledge and contributes to the betterment of society. Its transformative education encourages independent thinking and nurtures global citizens who will make a difference. NUS educates its students not just for today, but for the future.

Box 7.1 The National University of Singapore, Mission and Vision Statement

Vision: A leading global university shaping the future

Mission: To educate, inspire and transform

Values: innovation, resilience, excellence, respect, integrity

The National University of Singapore aspires to be a vital community of academics, researchers, staff, students and alumni working together in a spirit of innovation and enterprise for a better world.

Our singular focus on talent will be the cornerstone of a truly great university that is dedicated to quality education, influential research, and visionary enterprise, in service of country and society.

Source National University of Singapore. Vision, mission, values. <http://www.nus.edu.sg/about>.

⁵Source QS Top Universities. QS world university rankings 2021. <https://www.topuniversities.com/university-rankings/world-university-rankings/2021>. Accessed 9 November 2020.

⁶Following the July 2020 elections, NUS alumni now comprise half of Singapore's 14th Parliament (45 members) (NUS 2020a).

7.2.2 *Holistic Education and Lifelong Learning to Prepare Students for the Future*

The university prepares its students by promoting interdisciplinarity, inculcating critical thinking skills, encouraging experiential learning, and providing career guidance and support.

The university recognizes that education does not end with undergraduate study. In a world of rapidly evolving technology, shifting markets and global interconnectedness, learning must continue beyond one's early 20s—not only for the benefit of the individual learner, but so that collectively, people can address complex problems like climate change and global health, and understand and meet market demands. At NUS we are building a culture of lifelong learning.⁷ Enrollment is now valid for 20 years from the point of undergraduate admission, making alumni automatically eligible for continuing education courses that have been curated from 17 NUS schools and faculties to keep their expertise relevant and current. Selected continuing education courses can be stacked into qualifications such as graduate diplomas, or even bachelor's or master's degrees. Short courses are available all through the year, and modular courses have intakes in August and January.

7.3 Future-Proofing Graduates

7.3.1 *Preparing Undergraduates*

7.3.1.1 General Education Requirements

During their first 2 years at NUS, every undergraduate must take a module in each of five “pillars” (Human Cultures, Thinking and Expression, Singapore Studies, Asking Questions, and Quantitative Reasoning), including a course in Computational Thinking. These inculcate higher-order qualities of the mind, going beyond practical know-how and skills for daily life. These requirements develop aspects of knowledge and abilities we expect of learned individuals, not just those required for specialization in a particular discipline or profession.

7.3.1.2 Interdisciplinary Studies

Singapore's former's Prime Minister Goh Chok Tong introduced the “Thinking Schools, Learning Nation” vision in 1997, with the objective of promoting a holistic

⁷NUS President Tan articulated how NUS is strengthening the lifelong learning initiatives (Tan 2020a).

learning ecosystem that includes students, teachers, parents, and industry.⁸ This laid the foundation for an interdisciplinary approach to education. One of the things that came out of this was the Integrated Project Work initiative, which exposes primary school students to activities involving different disciplines such as science, mathematics, and the English language (Saravanan 2005, p. 2). This has fostered creativity and critical thinking among students.

Universities such as NUS play a key role in promoting and furthering interdisciplinary education so that learners carry this approach into their careers. In a thought piece published in *The Straits Times*, NUS President Tan Eng Chye observed that providing solutions for the complex, ill-defined, interconnected and “wicked” problems of today and the future “...requires integrating knowledge, skills and insights from different disciplines... We must now balance depth with breadth. Disciplinary rigor is still necessary, but will not be enough” (Tan 2020b).

Over the years, NUS has been inspired by an educational approach based on “*T-shaped*” competencies, the horizontal part representing breadth, and the vertical part the depth of knowledge in a specialized field; for example, entrepreneurial skills for breadth, coupled with advanced engineering expertise. However, graduates of the future need to be equipped with *multiple* abilities, so we now encourage our students to double the T, moving to “*Pi-shaped*” competencies. Given market demand, we urge students to combine a major in science, technology, engineering, or mathematics with a major in the humanities or social sciences. Training in two fields can occur in tandem, or in interdisciplinary fashion.

Starting in academic year (AY) 2021/22, students entering NUS may choose from 10 interdisciplinary degree programs.⁹ Students in these programs will have two majors (*Pi-shaped* competencies), but rather than pursuing these in a traditional, parallel way, the new programs will focus on the integration of disciplines. Compared to a traditional double degree that provides deep understanding of two separate topics, the new cross-disciplinary approach will allow the students to also gain a clear understanding of the integration between the two topics. Possible pairings include economics and data science, and computing and project management. Students will take an equal number of courses in each of their two majors plus integrative projects involving both.

7.3.1.3 New Majors, Minors, and Specializations

To help prepare students for multiple career pathways and foster interdisciplinarity, NUS is expanding options for students to pursue double majors, second majors, and minors, and is creating more unrestricted elective space to explore broader interests. Recent additions to major options include a Bachelor of Science (BSc) in Data Science and Analytics, a BSc in Pharmaceutical Science, and a Bachelor of Landscape Architecture. New minors include Infrastructure Management and

⁸Saravanan (2005) detailed the curriculum review in Singapore schools to implement the vision.

⁹NUS (2020b) highlights the possible pairings of disciplines.

Table 7.1 National University of Singapore

| | AY2017/18 | AY2018/19 | AY2019/20 | AY2020/21 |
|-----------------------|-----------|-----------|-----------|-----------|
| Double Major Programs | 32 | 86 | 89 | 90 |
| Minor Programs | 63 | 94 | 108 | 105 |

The university offers some degree programs with overseas institutions

AY = academic year

Source Office of Research and Education Analytics, National University of Singapore

Finance, and Information Security. Specializations include Digitalization of Urban Infrastructure and Quantum Technologies. NUS also offers 70 joint, double, and concurrent degree programs with overseas institutions (Table 7.1).¹⁰

7.3.1.4 Self-Directed Learning

To empower students to take direct responsibility for their learning experience (an important part of lifelong learning), NUS offers courses under a concept titled Design Your Own Module (DYOM). Launched in August 2019, DYOMs can be either *edX* massive open online courses (MOOCs), or a group of at least 10 students who choose the subject and instructor for a module (instructors may come from industry). Between August 2019 and February 2020, 65 students took 92 *edX* MOOCs, and 27 groups designed and completed their own modules. DYOMs count as unrestricted electives and are graded on a “completed satisfactorily” or “completed unsatisfactorily” basis, which encourages students to step outside their field of study or comfort zone to explore other fields.¹¹

7.3.1.5 Experiential Learning

Experiential learning is a critical part of preparing our undergraduates for the future. Hands-on experience clarifies a student’s interests and talents, and creates valuable human and professional connections. NUS offers internships, study abroad, and opportunities to engage in entrepreneurship. More than 4,000 students participate in a global program annually; in AY2019/20 over 8,000 students had internships.

More NUS programs are making internships compulsory; however, more students *choose* to engage in an internship, even if not required. In the last 5 years, there has been a 135% increase in the number of students participating in compulsory internships. Over the same 5 years, there has been a 24% increase in the number

¹⁰Between AY2017/18 and AY2019/20, the proportion of *new students* entering NUS with double specializations rose from 9% to 21%, while the proportion of *enrolled students* who have double specializations rose from 15% to 29%. These figures are the most recent available and include students who graduated in AY2019/20 (source: NUS Office of Research and Education Analytics).

¹¹NUS (2020c) outlines how students can participate in the DYOM initiative either by MOOCs, or supervised group work.

of students completing noncompulsory internships. The students have interned with multinational corporations like Google, AstraZeneca, ExxonMobil, and Visa; and with local employers such as DBS Bank and Grab (a Singaporean technology company with ride-sharing and delivery services).

Many NUS students choose to participate in a global learning experience. In AY2019/20, 2,205 NUS students studied at one of 300 partner universities in more than 40 countries. In the previous year, more than 5,500 NUS students had an international learning experience, whether study abroad or a shorter program or trip.

Finally, the university offers its students the chance to engage in and learn about entrepreneurship through the NUS Overseas Colleges (NOC) program. A unique take on study abroad, NOC offers a combination of full-time start-up internships and part-time academic study in entrepreneurial hubs such as Silicon Valley, Israel, Shanghai, and Toronto. More than 3,400 students and more than 1,300 companies have participated in NOC, with nearly 90% of alumni involved in innovation and enterprise at some point in their careers.

7.3.1.6 Career Guidance

The NUS Career Centre was restructured as the Centre for Future-Ready Graduates (CFG) in 2014. CFG applies a multidimensional, client-centric approach to help NUS students discover their passions, refine their skills, and demonstrate their value to employers. Beginning with the end in mind, CFG works with students from their first year to enhance their employability through a repertoire of career programs and industry-focused experiential opportunities. Students are encouraged to equip themselves with skills that are transferable across a broad range of job opportunities and to take a structured approach to explore multiple career pathways, develop people skills, build resilience, and gain relevant exposure. CFG has incorporated perspectives of employers in developing topics such as the future of jobs, employability skills, personal branding, and interview skills.

Each year, around 10,000 students participate in one of our career readiness programs or meet with a certified career advisor for personalized coaching.

Career readiness programs include the following:

- (i) Career Catalyst, a credit-bearing module focusing on career planning, including self-marketing;
- (ii) workshops on preparing for interviews and cultivating successful workplace traits;
- (iii) the NUS Global Mentorship Program, which pairs students with internationally experienced industry professionals; and
- (iv) Roots and Wings 2.0, a series of mini-modules offered in collaboration with the Department of Psychology, each of which teaches a soft skill such as resilience or collaboration.

Many CFG events give students opportunities to meet and network with potential employers. Annually, some 20,000 students connect with employers and alumni at various campus recruitment talks and career fairs.

We also use technology and web-based resources to prepare our students for their futures. New online resources such as the NUS *TalentConnect* job portal help students plan their careers and find jobs and internships. Students can upload their curriculum vitae into *TalentConnect*; these are compiled and shared with key employers.

In 2019, NUS launched *Career+*, an application that uses artificial intelligence to help students choose courses that will prepare them for their ideal jobs. The app informs students about possible careers for the academic degrees they are pursuing, recommends courses based on careers of interest, and suggests job opportunities based on the skills that students have acquired from courses they have already taken. *Career+* is also available to NUS alumni to identify NUS continuing education and training (CET) courses that will help them acquire and sharpen skills for advancing their careers.

7.3.2 Postgraduate: Enabling Continuing and Lifelong Learning

Over the past 5 years, NUS has accelerated its expansion of CET courses and its horizon for engaging with learners. As then acting Minister for Education Ong Ye Kung said at the launch of the NUS School of Continuing and Lifelong Education: "...the universities' role in education does not stop after graduation".¹²

7.3.2.1 School of Continuing and Lifelong Education

The School of Continuing and Lifelong Education (SCALE) was created to ensure a holistic approach and to unify professional development and CET efforts throughout the university. Establishing SCALE meant developing the structure to facilitate large-scale training delivery, following a three-pronged strategy to create a department that will provide the right products to benefit the right students in an operationally sustainable fashion.

SCALE's initial course offering started with the "NUS Lifelong Learners" (L3) initiative. NUS schools and departments were tasked to consider how alumni could stay relevant when their 20-year journey through the formal education system was over. NUS L3 began by offering access to select existing courses, such as individual courses in various master's programs. Three years later, and with a deeper understanding of market demand, SCALE extended course offerings to the public under the "CET 500" program. Together, the NUS L3 and CET 500 catalogs have

¹²See *The Straits Times* (2016).

grown from 534 courses at the beginning of AY2018/19 to 651 by the end of AY2019/20.

To ensure wider access to professional upgrading opportunities, SCALE is positioned to assist with training and education across broad-based and multidisciplinary subjects. Students with an interest in intermediate and advanced courses on specific subjects can then pursue deeper studies within designated schools. For example, SCALE has worked closely with industry partners and expanded to four fields of study, to meet the changing demands of national economic activity:¹³

- (i) advanced manufacturing and engineering,
- (ii) urban solutions and sustainability,
- (iii) services and digital economy, and
- (iv) health care and biomedical sciences.

Complementing the academic pathway, NUS offers an alternative nonacademic, noncredit-bearing track with the equivalents of Certificate of Competency, Professional Certificate, Advanced Certificate, and Professional Diploma.

Besides the technical proficiencies taught in these fields, CET also ensures the inculcation of skills such as business management, business agility, design thinking, and digital skills that make up the “ABCD” of the internet economy—artificial intelligence, blockchain, cloud technology, and data management.

The NUS alumni family's 312,000 members were the initial customers of NUS CET. For corporate customers, SCALE created “All-You-Can-Learn” (AYCL), a customizable training program for businesses to upskill and reskill their employees. AYCL allows partner organizations to send trainees to attend both academic and professional courses. Since the end of 2018, NUS has signed memoranda of agreement with nine clients under the AYCL program, ensuring at least 28,000 days of CET within 3 years for the staff of participating organizations.

In order to provide relevant and applicable courses, NUS works closely with employers, both within Singapore and internationally, as well as with industry associations and unions to identify skill gaps and design learning interventions. To help employers and education providers plan for the future, the Singapore Ministry of Trade and Industry has developed transformation maps for 23 industries in six strategic clusters.

7.3.2.2 Expansion of Master's Programs

In addition to the many options available to adult learners through CET programs, the university has also expanded its master's offerings. New offerings focus on upskilling and reskilling to provide growth and employment opportunities for our students.

Some of our programs permit sequential credentialing, so students can earn graduate certificates and diplomas, stacking credits that can lead to a master's. Students in the Master of Social Science (Communication) program receive a

¹³We aim to offer sequential credentialing in these four areas.

Table 7.2 Semester 1 2020 update of lifelong learning (including Resilience and Growth)

| Type of course | Unique students | Enrollment |
|---------------------------|-----------------|------------|
| L3 modules | 97 | 128 |
| Professional Certificates | 633 | 633 |
| Executive Certificates | 67 | 67 |
| Total | 797 | 828 |

Some master’s programs, like Master of Science in Industry 4.0, offer specializations such as Additive Manufacturing, Data Mining and Interpretation, Deep Learning for Industry, Digital Supply Chain, and Internet of Things

L3 = Lifelong Learners program

Source Office of Research and Education Analytics, National University of Singapore

graduate certificate upon completion of 16 modular credits, a graduate diploma with 24 modular credits, and a master’s with 40 modular credits (including a final project). This program also allows students to pause after completing the graduate certificate, and to return later to complete the master’s.

Some of our new master’s programs, like Master of Science (MSc) in Industry 4.0, offer specializations. Students can earn a graduate certificate in the specialization or go on for the full MSc. Specializations in MSc in Industry 4.0 include Additive Manufacturing, Data Mining and Interpretation, Deep Learning for Industry, Digital Supply Chain, and Internet of Things (see Table 7.2). Other new specializations for the master’s degree programs include venture creation, data science and machine learning, forensic science, food science and human nutrition, pharmaceutical science and technology, computing, communication, economics, and petroleum projects and offshore technology. Several of these programs are offered as either full- or part-time courses.

Some specializations require completion of a consulting project, wherein a team of students work with a private, public, or nonprofit organization to create a specific industry application or solve a problem. Students are mentored by a faculty advisor and a company representative (the latter can support students with further industry connections).

Offering these new postgraduate programs is congruent with NUS’ role in fulfilling Singapore’s Smart Nation strategy.¹⁴ NUS is home to the Smart Nation Research Cluster¹⁵ established in 2016 to drive and implement strategic capabilities in data science, analytics and optimization, artificial intelligence, cybersecurity, and simulation and visualization. Furthermore, NUS has forged significant partnerships

¹⁴The Smart Nation Digital Government Office outlines this in a vision paper. See Smart Nation Singapore. Transforming Singapore through technology. <https://www.smartnation.gov.sg/why-smart-nation/transforming-singapore>.

¹⁵Further information can be found on National University of Singapore. Smart nation. <http://nus.edu.sg/research/key-areas/smart-nation>. See also details of the press release on Tan (2015).

with industry organizations to expand the depth and breadth of research and teaching. Some of these private sector partnerships and national-level initiatives include:

- (i) AI Singapore,
- (ii) Grab-NUS Artificial Intelligence Laboratory,
- (iii) Lloyd's Register Foundation Institute for the Public Understanding of Risk,
- (iv) NUS-Singtel Cyber Security Research and Development Laboratory, and
- (v) Singapore Data Science Consortium.

7.4 Experiencing Disruption: Coronavirus Disease

Although Singapore reacted swiftly and decisively and has weathered the coronavirus disease pandemic admirably from a public health perspective, NUS, like other organizations and institutions, has been greatly affected by the crisis. We had to move to remote learning for most of spring 2020, and incorporate remote assessments. For fall 2020, all courses are offered online; only some courses are offered face-to-face under strict conditions. We are proud of the efforts expended to keep students, faculty, and staff safe.

7.4.1 *The Resilience and Growth Initiative*

For new graduates entering the job market in 2020, the negative economic impact has meant reduced employment opportunities. Working with government and industry, NUS launched the Resilience and Growth Initiative (R&G) to help our students and recent graduates overcome the immediate economic effects of the Coronavirus disease pandemic. R&G went from conceptualization to market in just 3 months, welcoming our first students into the initiative in September 2020.

The R&G includes the following:

- (i) direct financial support, in the form of grants to our neediest NUS full-time undergraduate students (given on top of the existing regular financial aid that students receive);
- (ii) an opportunity to join NUS by creating 200 full-time and 800 traineeship positions for our fresh and recent graduates¹⁶;
- (iii) increased access to continuing education through the provision of four free CET modules (stackable toward graduate or professional certifications) to all fresh graduates;
- (iv) students who enroll in self-funded master's programs at NUS get 3-years interest-free fee deferment; and

¹⁶To date, we have established approximately 100 full-time positions at NUS for our fresh graduates and have admitted about 500 graduates to the traineeship program.

- (v) funding for solutions where NUS will fund team projects that empower our graduates to have an impact on our people and our society in a postpandemic world.

The enrollment for L3 course for Semester 1 2020, including R&G students, is presented in Table 7.2.

For modular courses, R&G students represent about 30% of the total number of unique students enrolled (348) and modules taken (447). Professional certificates and executive certificates are new offerings. The enrollment is encouraging, especially with respect to the professional certificates, which are noncredit bearing. Executive certificates take more effort to complete (the duration for each is one semester).

7.4.2 Flexible Continuing Education and Training

The move to remote learning in the spring of 2020 expanded NUS' ability to provide online learning, especially synchronous distance classes. Building on our Learning Management System (LumiNUS) platform, NUS is designing and creating more asynchronous content for students and CET learners who are unable to attend scheduled lectures. This gives students increased opportunities for self-paced learning.

7.4.3 Supporting Singapore's Workforce

To help individuals and businesses weather the pandemic, Singapore's fourth stimulus budget (passed in May 2020) included funding for a package to create 40,000 jobs; 25,000 traineeships; and 30,000 skills training headcounts.¹⁷ As part of this effort, NUS agreed to provide 6 months of skills training to help job seekers learn new and in-demand skills, and to facilitate their re-entry into the workforce as the economy picks up again.

Besides the training courses, NUS has worked to ensure that there are real jobs waiting for those who participate in the program. Work placements act as incentives and make jobseekers see real value in the courses, helping them persevere through challenging circumstances. NUS also extended its counselling services to provide personal support to program participants, and to help with motivation. Participants receive a training allowance from the government.

By keeping a watchful eye on the future and maintaining a willingness to innovate, NUS continues to respond to economic and employment shifts. Our flexibility also enabled us to respond to the pandemic rapidly and with less disruptions on learning.

¹⁷The Singapore national budget addition is estimated at S\$2 billion (US\$1.42 billion as of 26 May 2020) (*The Straits Times* 2020).

7.4.4 *Re-imagining the Future*

With a commitment to high-quality teaching, carefully designed curricula, and an emphasis on experiential learning, NUS is preparing its students for the rapidly changing workplace of today and tomorrow.

In AY2021/22, NUS will establish the NUS Colleges of Humanities and Sciences, a collaboration between our Faculty of Arts and Social Sciences, and the Faculty of Science. Students in the College will have flexibility in degree choices (Bachelor of Arts, Bachelor of Science or Bachelor of Social Sciences), and access to cross-disciplinary opportunities. They will also receive a strong foundation in reading, writing, critical thinking, and numeracy—skill sets that employers value. This shift from NUS' traditional discipline-centric approach to a flexible, broad-based education will enhance the educational quality, market relevance, and learning experience of our students. It will prepare our graduates to not only thrive in, but to shape the future.

7.5 Challenging Perceptions, Participation, and Stakeholders' Interactions

The interaction of the key actors in the lifelong learning agenda—target participant(s) at the *micro level*; the support of employers and presence of the learning program providers at the *meso level* (in this case, NUS); and the state at the *macro level* could affect the level and extent of an individual's participation in any learning program (Boeren 2017). As such, it is important to consider these relationships when designing and implementing innovative learning programs. We argue that Singapore's initiatives to promote lifelong learning demonstrate an attempt to break down the dominant barriers—a preference for merit- and degree-based credentials, lack of expanded and flexible approaches to learning, and a siloed environment and lack of interaction among disciplines. Although these challenges are similar to those faced by other universities, Singapore's lifelong learning activities were fueled with substantial funding from the government.

Also, NUS responded to these challenges by offering programs that permit interdisciplinary collaboration, more self-directed and experiential learning activities, and sequential credentialing to focus on teaching key skills students can immediately apply in their current and future workplaces. However, the preference for paper-based qualifications is still embedded in the cultural and social psyche of the citizens (Tan 2017). Macro and meso-level actors could do more to challenge these perceptions; in redefining the definitions of success of learning and providing more options for graduates to excel; and in working with individuals on how they can potentially contribute their talents and skills to meet the needs of society. In addition, continued engagements with families, voluntary associations, and organizations working in socio-cultural affairs could also help in building more inclusive learning

societies (Osborne et al. 2013). In time, we will learn whether these new approaches succeed.

Beyond the economic agenda and market-driven orientation of the programs, lifelong learning providers such as NUS should continually work to address how their role could also contribute to meeting sustainable development targets, and where our learners and graduates could help fill the void. Powering learning societies necessitates the collective participation of all the relevant actors in designing and offering meaningful programs that promote environmental sensitivity, inclusive participation, and social justice, among many other things.

The global pandemic amplified the need to continue the discourse on strengthening lifelong learning initiatives not just within our countries but also in our networks and regions. As a global university, NUS could tap on its comparative advantage to support lifelong learning initiatives for its regional neighbors in Southeast Asia. As research, teaching, and thought leadership forms part of the university's lifeblood, NUS' own lifelong learning journey could also uniquely contribute to similar institutions that are supporting the learning communities in Asia and the world. Since 2012, NUS has been offering the NUS Programme for Leadership in University Management (TF-PLUM) through the Temasek Foundation International. This program for university leaders from the People's Republic of China, India, and the Association of Southeast Asian Nations has created space for interaction and collaboration among regional universities.¹⁸ Some of our graduates and learners are now looking forward to establishing their careers, businesses, and partnerships in these economies, presenting a larger opportunity for NUS to continuously make our lifelong learning programs responsive to the future career and personal aspirations of our students, and in influencing the region to continually embrace lifelong learning.

7.6 Conclusions

This chapter has demonstrated that meso-level institutions like NUS play a major role in future-proofing the workforce by offering interdisciplinary and multidisciplinary programs, learner-centered pedagogy and activities, as well as expanded lifelong learning opportunities among its graduates and the broader Singaporean society. In recent years, NUS has introduced many programs and initiatives to support both national-level and individual-level aspirations. We therefore hope this chapter generates more deep thinking and collective reflections among all the stakeholders in the education sector. As we search for more creative and innovative ways to promote and establish robust learning opportunities—in spite of many kinds of disruptions—we aspire to further support our citizens' capacity building and contribute to society with its ever-changing needs.

¹⁸Over 250 university leaders have benefitted from the TF-PLUM (see NUS. Thought leadership. <http://nus.edu.sg/gro/about-us/thought-leadership>. Accessed 11 November 2020).

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