

# Chapter 10

## Science, Social Responsibility, and Education: The Experience of Singapore During the COVID-19 Pandemic



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**Abstract** In this chapter we first outline how the pandemic unfolded before highlighting the key thinking and strategies Singapore adopted in policy responses towards the crisis. The two key principles of Singapore's approach, science, and social responsibility, contributed greatly to its success in handling the public health crisis. This chapter will elaborate on these principles and examine how these policies were carried out in the educational realm. We look at how Singapore relied on its strengths of proactive rational planning and execution to facilitate the transition to home-based learning (HBL) and the subsequent re-opening of schools. Concomitant with policies to address health and well-being for all students were strategies to ensure continuity of learning, student engagement, and innovation in the new learning environment. The use of online learning portals such as the Student Learning Space enabled all students from primary to pre-university levels to have equal access to quality curriculum resources. Professional development and preparation of teachers pertaining to facilitating new modes of learning were as important as implementation measures. Given the unexpected impact of the pandemic and the need for scalability there were also many challenges to ensure equitable access and holistic well-being for vulnerable groups of students. Looking forward, we discuss the implications of the pandemic on Singapore's education scene, such as how it elevated core issues related to curriculum, pedagogy, and design of learning environments. We talk about opportunities for some of these issues to be addressed in policy and research, and how doing so can better build an adaptable education system for the twenty-first century.

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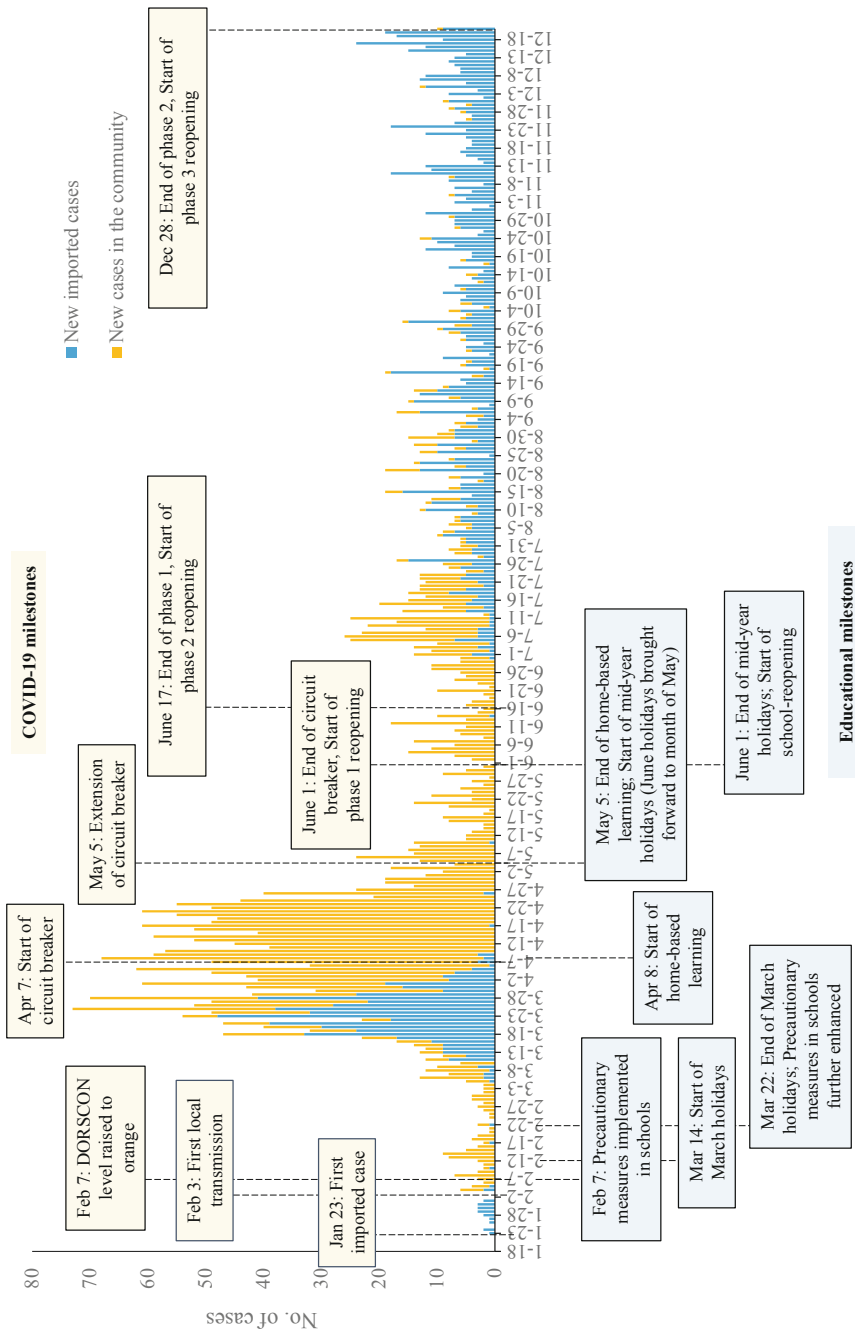
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## 10.1 Introduction

Singapore is a small island nation with an estimated population of 5.7 million people. Being a small country, it is governed by a central government and thus policies and measures are often applied consistently nationwide. As a combination of a public health crisis, an economic recession, and a prolonged period of social isolation (Golberstein et al., 2020), the COVID-19 pandemic has taken a toll on Singapore's economy, disrupted many Singaporeans from their regular routines, and brought about physical, mental, and financial challenges for many. However, Singapore's policy response to the crisis has been noteworthy, and widely lauded to have been prompt and resilient, yet flexible. By January 2021, Singapore had announced the implementation of Phase 3 (Ministry of Health, 2020), the third and last phase of the reopening of Singapore's businesses and public spaces ever since the country exited its lockdown phase in June 2020. In this chapter, we discuss the key principles of Singapore's policy response to the crisis highlighting science and social responsibility, and further examine how these principles were applied to policies in the educational context. We then discuss challenges, implications for the education system, and opportunities for research and policy.

## 10.2 Unfolding of the COVID-19 Pandemic in Singapore

This section provides some context of the COVID-19 pandemic timeline unfolding in Singapore in 2020 (see Fig. 10.1). Singapore's first imported COVID-19 case (a 66-year-old Chinese national) was reported on January 23, 2020, followed by a couple more imported cases in the following days. At this point in time, locals went about their daily lives as per usual, with little concern of the threat of the virus as there was still no evidence of transmission within the local community. Only after local transmission was first reported on February 3 did the COVID-19 pandemic start to reach national attention in Singapore. On February 7, Singapore raised its national risk assessment level, known as the Disease Outbreak Response System Condition (DORSCON) level, from "yellow" to "orange" to alert of the possibility of a local pandemic. This led to heightened public awareness of the virus, and triggered reactions of fear such as panic buying at supermarkets to stock up on necessities. In late March, many Singaporeans abroad returned home, causing a spike in imported cases. This was followed by a massive outbreak in foreign workers' dormitories and a fast-increasing number of new and unlinked community cases. In response to this, the Singapore government carried out a stringent set of lockdown measures from April 7 to May 4, officially known as the "circuit breaker". The circuit breaker was subsequently extended for another four weeks to June 1. During the circuit breaker, all schools and non-essential workplaces were closed, and all gatherings with family or friends who did not live together were banned.



**Fig. 10.1** Timeline and Milestones of the COVID-19 Pandemic in Singapore. *Note* Information for daily statistics was retrieved from 2020 data published by the Ministry of Health (MOH). Cases in foreign worker dormitories are not reported here

After the circuit breaker, Singapore slowly moved towards reopening of workplaces, schools, and businesses via three phases. Phase 1 of reopening lasted for about three weeks, where some activities beyond the essential services were allowed to resume progressively (e.g., hairdressing services beyond haircuts, bookshops, and motor vehicle servicing). Phase 2 lasted for about 6 months and allowed for dining in with a 5-person limit, as well as the reopening of other services like retail. On December 28, Singapore transitioned into its third and final phase of reopening, increasing the public gathering and home visiting limit from 5 people to 8. The government also introduced free vaccinations for all Singaporeans and long-term residents.

### **10.3 Operating on Science and Government-Wide Approach**

Taking a government-wide approach entails different ministries coming together to achieve policy coherence and synergy. Using such an approach, Singapore's priorities during the crisis were to protect the lives of all citizens and to ensure economic livelihood and future readiness. Singapore's stance and approach towards handling the COVID-19 pandemic have been based on two key principles: science and social responsibility. First, management of the crisis was driven by science, where implementation of any policies and measures was informed by data and scientific evidence. For example, the science of infectious diseases tells us about the danger of virus non-containment, where cases can increase at an exponential rate if uncontrolled. Thus, from the beginning, Singapore prioritized the health and safety of its citizens by being proactive and decisive with rolling out containment measures. As early as the start of January 2020, when news of the virus outbreak in Wuhan were first reported, Singapore had already begun screening measures at Changi Airport for incoming travelers from the region and issued health advisories for the general public. On January 31, Singapore was the first country in Southeast Asia to ban new visitors of any nationality with recent travel to mainland China. This demonstration of early preparation and precaution can be contrasted with many countries who did not start preparation until the virus had already entered their country.

Over the various stages of the pandemic, Singapore swiftly and decisively adapted to new changes in scientific evidence and information on the situation on the ground. As more was known about the transmission of COVID-19 itself, Singapore implemented measures based on such evidence. COVID-19 was found to be transmitted via respiratory droplets and close contact, thus Singapore established a deep cleaning campaign at public places called SGclean to minimize contamination, as well as introduced stringent isolation measures to minimize contact. When imported cases were on the rise, Singapore imposed stay-home and quarantine orders for incoming travelers, with strict penalties for non-compliance. When the number of unlinked community cases spiked, Singapore implemented the circuit breaker to prevent the

virus from spreading further within the community. After discontinuing the circuit breaker, the Singapore government remained cautious and methodical in its approach and reopened Singapore in deliberate phases that minimized mingling, keeping the number of cases under control. To accommodate the increased public movement after reopening, the government also implemented digital systems such as SafeEntry and TraceTogether to facilitate efficient contact tracing efforts. Later, COVID-19 was also found to present as asymptomatic in certain people, thus Singapore engaged in aggressive testing of high-risk populations (e.g., hawkers, early childhood staff, incoming travelers, foreign workers living in dormitories), successfully detecting asymptomatic cases (e.g., Toh, 2020; Yong, 2020) and significantly reducing the spread of the virus.

## 10.4 Emphasizing Social Responsibility

Singapore also emphasized the importance of social responsibility throughout the pandemic. Exercising social responsibility in this time meant ensuring the care and safety of others in the community. Many measures were based on this principle, where people who may be more vulnerable to contracting COVID-19 were given the protection or precautionary advice needed. For example, frontline workers were supplied with adequate virus protection like suits and masks, and the elderly were given priority shopping hours and queues at supermarkets to reduce their exposure in public. Social responsibility was also a consistent narrative used in laying out precautionary guidelines and rules for the public, such as maintaining one-meter distances, staying home when unwell, and always wearing masks—it was emphasized that these measures should be taken to protect our loved ones and others.

These principles of science and social responsibility were also at the heart of educational policies during the pandemic. Education in Singapore is centralized and governed by the Ministry of Education (MOE), where there are about 350 primary and secondary schools and a half of a million students enrolled. COVID-19 related measures implemented by the MOE were also driven by science and strongly aligned with those implemented and advised by the Ministry of Health (MOH). This was made possible by the highly centralized political model on which Singapore operates, where all government ministries have a strong line of communication with each other, allowing for swift and consistent implementation across the health and education sectors. As one of the smallest nations in the world, centralization works well and can be executed successfully in a coherent, government-wide manner. In comparison, contention between health and education responses were more prominent in other larger countries in this book (e.g., United States, Spain) and worldwide.

When Singapore's MOH raised the DORSCON level to "orange" on February 7, implementation of precautionary measures at multiple ministry levels followed promptly after. On the same day, MOE issued a press release to step up precautionary measures in schools (Ministry of Education, 2020e). Large group and communal activities such as assemblies, camps, and mass celebrations were to be suspended,

recess times in schools were to be staggered, and co-curricular activities or after-school programs could only continue in smaller groups. Any inter-school activities were also suspended. This was in the first term (quarter) of the academic year and these measures were set to be in place tentatively until the end of the March holidays, which is a week-long break in March for students after the first term.

After the March holidays, it was further announced that hygiene and precautionary measures in schools were to be enhanced. All co-curricular activities and inter-school activities continued to be suspended or deferred until further notice. All schools were to adopt cleaning and safe-distancing practices, such as fixed exam-style seating for Primary 3 students and above (where students sit individually with spaces in between their desks), and fixed group cluster seating for Primary 1 and 2. There were also wipe-down routines in classrooms and cafeterias as well as assigned seating and play areas in other parts of the schools. On March 24, a joint statement between MOE and the Ministry of Social and Family Affairs (MSF) was released to announce additional precautionary measures for younger students from preschool and primary school (Ministry of Education, 2020b); students staying in the same household as a person who had returned to Singapore from any country were to be placed on a 14-day Leave of Absence (LOA).

After the circuit breaker, school measures were also in line with the three phases of reopening. In Phase 1, only graduating cohorts from primary and secondary schools attended school physically from Mondays to Fridays, whereas students from other cohorts rotated weekly between home-based learning (HBL) and returning to school for lessons to reduce the number of students in schools at any one time. From Phase 2 onwards, all students returned to school from Mondays to Fridays. There was also resumption of PE lessons and co-curricular activities with the assurance that staff and students continue to strictly adhere to safety management measures.

These cautiously controlled measures of precaution and safety proved to be effective in protecting our students from contracting COVID-19. As of December 2020, only about 0.23% of COVID-19 cases in Singapore were children or adolescents aged 20 and below (Covid19 SG, 2020), of which none caught the virus from schools or institutes of learning. These cases mainly caught the virus from overseas or from household members who were overseas, suggesting that the LOA precautionary measure was indeed a sound policy and helped prevent further spread amongst younger students.

However, although children and young adolescents are less likely to contract COVID-19 or have their physical health directly impacted by the virus (Davies et al., 2020; Viner et al., 2020), they risk suffering major detriments to their learning and development during this time. Disruptions to learning, such as cancellations of classes, lectures, and national examinations, will put the education of affected students on hold for a long time. On a larger scale, this poses significant problems to logistics in subsequent years, such as catching up for all the missed lessons or having the size of two or even more cohorts sit for a national examination at once. Singapore was cognizant of such supply-chain shifts or unforeseen consequences of disrupted learning—not just for students themselves, but for the entire education system. Thus, on top of protecting the health and safety of students from the virus,

minimizing disruptions to learning was of the utmost importance. This emphasis was reflected in how strategies to ensure continuity of learning, student engagement, and innovation in the new learning environment were employed in conjunction with health and safety measures.

### **10.5 Minimizing the Loss of Learning and Seizing Opportunities for Teachable Moments**

One way Singapore and MOE helped to maintain continuity of learning for their students was through helping them and teachers ease into home-based learning (HBL) during the circuit breaker. Before the circuit breaker started, MOE had implemented one day of HBL a week for schools, in anticipation of the possibility of a nationwide lockdown and full-time HBL. This allowed schools to progressively transition to the online learning model, and for teachers and students to familiarize themselves with the system. This methodical process allowed for a gradual adjustment into full-time HBL instead of an instantaneous switch that could cause confusion, unpreparedness, and backlashes to students' learning. When the circuit breaker was announced to be extended for another month to June 1, the academic calendar was also readjusted to accommodate this change. The month-long mid-year school holidays, originally scheduled in the month of June every year, was brought forward to the month of May to coincide with the second month of circuit breaker. This helped to minimize any loss of learning days at school. Ultimately, Singapore students only missed about a month of physical lessons at school, and even so, learning was maintained through home-based and online means during this month. The education ministry also took the opportunities to prepare teachers with resources about the science of the COVID-19 virus and the importance of health and hygiene practices. Schools also capitalized on the principle of social responsibility and emphasized educating students on the need for social distancing, isolation of infected persons, and strategies of controls such as screening and contact tracing. These were also opportunities to build resilience and highlight exemplary care of others through responsibilities and courage.

### **10.6 Use of Technology: Student Learning Space**

In addition, Singapore utilized innovative tools to help sustain student engagement and motivation under significant changes to the learning environment and mode. With HBL, replicating the traditional classroom onto an online medium (e.g., video-recording lessons as if they were face-to-face) may seem contrived and may no longer be as effective or engaging. The biggest challenge here was the ability to capitalize on online tools to offer better learning opportunities for students (Ng, 2020). On this front, Singapore tapped into its pre-existing national online learning portal, the

Student Learning Space (SLS), as a learning and teaching platform for teachers and students during the circuit breaker.

SLS is a learning management system containing curriculum-aligned resources for various subjects and is made accessible to all teachers and students. On SLS, teachers can share relevant lesson resources and students can access them in a self-directed manner (Ministry of Education, 2020d). Students can approach various topics at their own pace and based on their own interests, encouraging personalized learning and greater student ownership. Resources also come in different forms, such as videos, animations, simulations, podcasts, and visual texts (Ministry of Education, 2020c). Using this wide variety of forms and additional tools on SLS (e.g., installing pop up questions to make students' thinking processes visible or embedding YouTube videos for demonstration), teachers can combine and curate resources in their preferred delivery, and customize them to students' needs.

Aside from lesson materials, testing materials like quizzes and activities are also available on the SLS, where students can self-assess their knowledge and obtain immediate feedback on their performance. Teachers can also monitor their students' progress on their learning and assessments, both at a class and individual level. This enables them to make informed decisions when providing targeted intervention to address any gaps in understanding. Thus, besides serving as a resource bank, SLS is also an adaptive and interactive platform that streamlines and enhances the distance-learning process by allowing customizability, individualized learning, and engaging exchanges between students and teachers.

SLS proved to be a useful tool for the HBL period during the pandemic. With many teaching resources such as lesson plans and curriculum resources already on SLS, it was easier for teachers to launch into online teaching without the need to transfer many physical materials themselves. SLS complemented the online video conferencing platforms teachers used to carry out online lessons such as Zoom and Google Meet, as well as external resources such as textbooks and workbooks, offering students a flexible learning experience that may be more engaging and effective in a home-based environment (Gov.sg, 2020; Teng & Ang, 2020). Nonetheless, teachers' IT savviness was a crucial factor for the success of SLS and HBL. This could not have been achieved without ICT being a significant component of the learning technologies that Singapore teachers are equipped with from pre-service to in-service professional development. In addition, ever since the SARS pandemic in 2003, schools scheduled their own e-learning weeks or activities yearly as a routine for teachers to re-acquaint themselves with educational technology and remain prepared in the event where virtual learning is needed. Thus, teachers were generally very equipped with the technological skills needed for virtual learning before COVID-19, making it easier to mount an initiative for home-based learning during the pandemic.



## 10.7 Professional Development and the Co-Sharing Teacher Community

Even so, Singapore ramped up e-learning professional development (PD) for teachers even further during the pandemic. From the moment Singapore had its first local case, the Academy of Singapore Teachers (AST) starting proliferating PD courses to provide support for teachers in navigating the digital space and implementing online HBL. Thus, on top of e-pedagogy guidance already offered to all teachers, AST increased the number of PD sessions on the MOE Student Learning Space to support teachers through this new challenge. Although e-learning has been part of Singapore schooling since SARS, the national circuit breaker during COVID-19 posed an additional unprecedented challenge for teachers that was not present during the SARS pandemic. During the SARS pandemic, school closures lasted for a maximum of 1 week, whereas during the height of COVID-19, school closure extended for a prolonged period of one month.

AST provided PD guidance on two main areas: planning and design, and creation of e-learning resources and packages. For the former, AST organized learning sessions, webinars, and workshops to guide teachers on how to plan for and design seamless school and HBL experiences for students. For example, webinars were organized for Mathematics teachers to share lesson planning examples that took HBL considerations such as student HBL readiness into account. For Science, workshops to design blended learning experiences that are seamless and meaningful for students were conducted, encouraging dialogue between participants so that they could share lesson ideas with each other and further refinements and enactments could be done with the guidance of facilitators. For Humanities, different ICT tools that could be used to enhance the learning experience were shared with and amongst teachers.

Similar courses were implemented to guide teachers in creating effective e-learning resources and packages. For Humanities, MOE hosted workshops to provide guidance to teachers to create e-lessons on the Student Learning Space, highlighting student engagement, effective assessment for learning, and depth of the subject. However, perhaps what is most valuable from these PD opportunities is the fact that it sparked creativity, community engagement, and the effective exchange of tips, advice, and support amongst teachers themselves. Many learning designers and teachers have come together to share how they design learning environments using ICT tools and have made their own creations available through open-source platforms for other teachers. For example, a group of teachers co-created a digital game undergirded by self-determination theory (Ryan & Deci, 2000) to support teaching of “Hypothesis Testing”, an A-Level Mathematics topic. The resource was made available for use to all teachers teaching A-Level Mathematics. For Science, members of Networked Learning Communities co-created and shared resources suitable for use for HBL. Teachers and professionals brought together by their passion for high quality education and continued learning for their students amidst challenging times was indeed a heartening sight.

## 10.8 Challenges of Learning for Vulnerable Groups

Despite efforts to create equal learning opportunities for all students during the pandemic, Singapore faced many challenges in ensuring equitable access for vulnerable groups of children. For example, during the circuit breaker and HBL period, fault lines in the digital space started to emerge between children from higher and lower socioeconomic status (SES) backgrounds. While the SLS was meant to be a platform for all students to have equal access to learning resources, some children from disadvantaged backgrounds did not have digital devices readily available in their homes to access the portal. For example, the Singapore Longitudinal Early Development Study (SG Leads) found that 44% of vulnerable families living in rental flats<sup>1</sup> do not have a computer or laptop at home, as compared to 4% for those from higher-SES families living in private properties. This figure is 54% and 11% respectively for tablets (Yeung, 2020).

Besides the availability of devices, there are also a variety of other factors that determine the extent to which students can reap the benefits of HBL, such as physical environment, parental skills, and connectivity issues (Lee, 2020). Even with digital devices, many low-income households also lacked the appropriate infrastructure and environment at home that are conducive for HBL. For example, many did not have their own Wi-Fi subscriptions at home, including 8% of families in rental flats (Yeung, 2020), or enough tables and chairs for all children to use, resulting in less ideal workspaces like the floor or kitchen. Many also had to share small spaces with other household members, which can be distracting and inhibit students from focusing. For example, rental flats are usually one or two rooms, with a small living space of 36 sq m to 45 sq m, yet 40% of SG Leads families living in rental flats have five or more household members squeezing within that small space (Yeung, 2020). Such space constraints may cause friction and impact children's concentration and learning. Another vulnerable group of students is children with special needs. Many require face-to-face support for behavioral, emotional, or learning needs, and thus many struggled during this time with absence of additional support. Children whose parents work in essential services also lacked caregiving and supervision during this period.

For such students who may fall through the cracks, Singapore was less prepared in terms of having measures already in place. This is possibly because of the quick and unexpected turn of events into a lockdown phase, and the pressing need for scaling up home-based education (i.e., preparing all students and teachers as a whole). Nonetheless, Singapore was quick to adapt and rolled out supportive measures once issues came to light. Children who did not have alternative care arrangements, or who might need additional school support such as access to digital devices or regular face-to-face engagement, were allowed to continue going to school during the circuit

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<sup>1</sup> In Singapore, families' SES can be roughly identified by their housing types. The most vulnerable families from low SES backgrounds live in rental units by the Housing Development Board (HDB), whereas the most advantaged families from high SES backgrounds live in private properties like condominiums and landed properties.

breaker and had adults available to supervise and support them. In addition, MOE loaned about 12,500 laptops or tablets to students, as well as 1,200 Internet-enabling devices to students who did not have enough devices at home for HBL (H. M. Ang, 2020). Some corporate telecommunications companies such as StarHub also sponsored students in need with free computer hardware and cables and Internet subscriptions (J. Ang, 2020). Primary and secondary school students on MOE's Financial Assistance Scheme (FAS) can also benefit from subsidies under the School Meals Program (SMP), which was originally set up to provide subsidies for meals purchased from the school cafeteria and consumed in school. During the circuit breaker period, these meal subsidies continued to be extended to these students regardless of whether they returned to school during this time (Ministry of Education, 2020a).

## 10.9 Lessons Learned and Future Implications

While the COVID-19 pandemic has been an unfortunate occurrence, there are silver linings and lessons that arose from the situation. Firstly, the pandemic has accelerated a shift in mode of learning, where many are starting to consider hybrid learning as a possible way of learning for the future. Hybrid learning combines online educational materials and opportunities for interaction online with traditional classroom-based instructional methods. To incorporate the "online" aspect into learning, the use of digital and online devices as tools is key. In general, there has been a lack of adoption of education technology solutions in schools in Singapore (Hutton, 2020). For example, although the SLS was implemented in 2018 and therefore existed before the pandemic, Singapore had never fully utilized it on a scalable basis; it was viewed more as an additional outlet for information rather than being integrated more extensively in day-to-day teaching and learning in school. Its extensive uptake and utilization were subsequently necessitated and expedited by the pandemic. This acceleration is also mirrored on the policy level, where the government has made plans to strengthen measures related to digital learning. For example, a government plan to roll out personal laptops or tablets for all secondary school students has been adopted seven years prior, to 2021 (Yuen, 2020). This is with hope of keeping social mobility alive, allowing all students to access and benefit from learning in the online and digital domains.

Secondly, the pandemic has also catalyzed a shift of the learning paradigm in Singapore from a more traditional one-size-fits-all approach, to one that is more differentiated and customized based on each student's learning needs, interests, and capabilities. This allows for learning and teaching that is more targeted and effective in fulfilling each child's specific potential. The blended learning model allows for flexibility in learning, especially during home-based components. Therefore, students who are excelling within the main curriculum can have independent time during home-based learning to learn about and pursue other things that pique their

interest. Materials and resources can also be recalibrated for students to target specific gaps in learning.

We envisage that the above shifts will translate into practical and policy implications in Singapore's education system in the future. We observed that education in Singapore generally tended to be rather conservative in adapting to the changes and demands of the twenty-first century. The pandemic catalyzed discussions to consider many of these potential changes as viable and have made people more accepting to embrace new ways of education. In June 2020, for example, Singapore's ex Minister of Education, Mr. Ong Ye Kung, voiced that HBL is set to be a regular part of schooling past COVID-19 (Davie, 2020), hinting at a shift towards hybrid or blended learning. Later, in December 2020, it was announced that secondary school and junior college students will spend 2 days a month doing HBL starting from the third term of 2021 (Ng, 2020). This signals that more educational shifts will be approaching. These shifts would not have been so quick to arrive without the pandemic. Because of the pandemic-initiated shifts, we speculate that many larger educational issues will arise both in Singapore and around the world, impacting different aspects of the education system such as curriculum, pedagogy, and structure. For Singapore, this may allow it to transform to be more aligned with the demands and trends of the twenty-first century.

### ***10.9.1 Curriculum***

Firstly, paradigm shifts in learning involve reconsidering curriculum design in new learning environments. Curriculum design in Singapore has its roots in the nineteenth century Industrial Revolution, where knowledge is largely taught within an analytical framework. Subjects are broken down into smaller modules and taught quite often in isolation or with little relation with each other in a check-list manner. Curriculum in Singapore should be redesigned to incorporate the connectivity and relativity between subjects, so that students at pre-university levels can understand how certain subjects and topics are interconnected, which will support learning at the university stage and beyond. For example, subjects that are interfaces between rudimentary subjects (e.g., biochemistry as an interface between biology and chemistry) can be introduced before university at primary and secondary levels, rather than solely at the university level. Interdisciplinary curriculum should be more pervasive within all levels of education.

The drive towards independent and self-directed learning also supports a shift away from the analytical framework. One of the goals of twenty-first century education is to instill the spirit of life-long learning, and the effects of the education system are meant to last for life. With this in mind, learning and its benefits will vary for everyone, and thus the standardized, module-based curriculum style of the analytical framework may start to lose relevance. At a conference by the Institute of Policy Studies in January 2021, Singapore's Education Minister Mr. Lawrence Wong raised a similar point aligned with this thinking. He mentioned that Singapore will make

fundamental shifts in its model of education and mindsets as part of post-pandemic plans, such as preventing “front-load learning when someone is young”, or treating “education as a conveyor belt for the job market” (Wong, 2021). This means that education should be viewed less as an end to secure a good job, but rather as a system to cultivate life-long learning habits and skills that are healthy, enjoyable, and beneficial for each student. The current analytical framework is less adept at doing this.

Instead, there is a need to retool curriculum design from a thematic approach, preparing students for society and the workforce as adults by instilling the skills and habits required. This is especially true since the requirements in the workforce have also evolved since the nineteenth and twentieth century. Rather than a strong emphasis on academic excellence, there is an even greater need for overarching skills like problem solving, critical thinking, and innovation. Apart from the core subjects and fundamental skill development, curriculum design should encompass the necessary skills and knowledge for students to take on larger, real world related issues in the future such as climate change, digitalization and automation, and artificial intelligence.

### ***10.9.2 Pedagogy***

Secondly, paradigm shifts also force us to reconsider pedagogical methods. Educational pedagogy in Singapore is still largely teacher-directed, despite some shifts towards student-oriented engagement and activities. Although research and theories in the past that focused on improving instruction and teaching from the teacher’s perspective were useful for effective didactics, new ecologies of learning are emerging where experiential and collaborative learning are even more important for developing twenty-first century skills. With the new learning environments, such as online learning or independent learning at home, pedagogical methods need to be much more facilitative and less didactical. Thus, it is likely that the education system will transform to incorporate and accept education that is more genuinely student-centered, where learning is highly personalized and flexible. Instead of having activities curated for them, students can create their own activities and direct their own learning based on their interests and strengths. This will also open opportunities for project-based and problem-based learning, where students direct their own learning with each other, and learn with and from one another. Teachers then take on design, facilitatory, and coaching roles rather than instructive ones.

### 10.9.3 Structure

Lastly, the structure of the academic or school life may also start to transform to be more fluid. Currently in Singapore, schools follow a fixed timetable and structure that students heed. For example, lessons are often organized in 40-min blocks. With the introduction of the hybrid learning model, the same structure in a physical, school setting might not be as replicable in the online realm. Thus, it is likely that while physical schooling may maintain some sort of structure and rigidity in its scheduling and planning to maintain order, adaptations need to be made when students are doing home-based, online learning, as the demands and environment are different at home. For example, it may be difficult for students to sit for 40-min blocks at home looking at a screen, as it is easier to disengage online than in real life. There are also fewer disciplinary agents at home as compared to in school.

Beyond our Singapore case and looking across cases in this book and worldwide, our postulation is that future shifts in the education systems around the world may embrace further structure, curriculum, and pedagogy changes which in some ways can be captured more broadly in Table 10.1, shown.

To accommodate these potential implications and transformations in the education system, research is required to ensure the smooth changes in curriculum, pedagogy, and academic structure. Initially, more research is required to understand learning in the online environment. In particular, it is crucial to answer key research questions revolving around students’ and teachers’ online learning and teaching behaviors and styles. For example, is there a deficit in learning when learning is done online? If

**Table 10.1** Our view of the potential educational shifts both in Singapore and globally post COVID-19

Type of shift	Pre COVID-19	Post COVID-19
Curriculum	Nineteenth century curriculum Legacy of Industrial Revolution with large amount of analytic content learning Subjects disconnected Curriculum fixed to tests	Twenty-first century curriculum Analytical, big picture, and generative thinking Integrative and connected learning Curricula cultivate deep learning and are attuned to real world skills and project accomplishments
Pedagogy	Twentieth century pedagogy Didactical teaching Little participation and self-direction Pedagogy fixed to teacher	Twenty-first century pedagogy Learning designed for engagement and self-direction Participatory learning Hybrid models of leaning and networked ecology of learning resources
Structure	Eighteenth century time-table format Fragmented learning Regimentation of schedule Students fixed to chair in class	Twenty-first century timetabling Thematic learning Immersive learning Flexibility of engagement

so, what are the mechanisms behind these deficits (e.g., engagement, motivation, lack of discipline)? Upon understanding the key mechanisms and outcomes, we can design online learning and tools that mitigate these. More research is also needed to test new pedagogical methods for teachers, considering the shifting role of the teacher from a didactic position to a more facilitatory figure. What is the best way to design the learning environment for students in these new environments? How do we prepare our teachers to do so? What are the skills and knowledge necessary for our teachers to become facilitators and designers rather than instructors? Teachers need to know new methods to engage students online, as well as be able to facilitate peer to peer discussions both online and offline as we move towards an increasingly project-based education style.

Ultimately, these movements in the education system need to be well supported by policy. Measures need to be in place to prepare for these movements. A couple of issues merit policy attention here. Firstly, with the widespread use of the internet and online tools, we need online infrastructure that is secure and accessible for all. Secondly, with possible changes to the way we perceive curriculum, pedagogy, academic structure, and learning environments in the future, there are needs for interdisciplinary experts beyond education to support these changes. We need to draw on the art and science of learning from education, psychology, neuroscience, and educational technology to understand how people learn best in differentiated situations and new environments. New policies, guidelines, practices, and measures need to be explored with participation and contributions from educators and students. As many parents and teachers are from older generations and are used to traditional education methods, there should be adequate guidance on how to transition into using digital devices and platforms, such as using workshops or community partnerships. Transitions should be as smooth as possible to alleviate anxiety and to motivate the public to accept and embrace these changes positively.

Lastly, education should not forget its narrative and promise for educating our future generations, which is that “no child is left behind”. For Singapore, the pandemic and HBL experiences have shown us that in the context of new learning environments, we are still inadequately prepared to support vulnerable groups of children to have equal access to learning opportunities. During the same conference mentioned above, Mr. Lawrence Wong also mentioned striving towards a fairer and more equal society as one of three “resets” we must adopt in post-pandemic Singapore (Wong, 2021). Regarding education, he endorsed the distribution of more resources to schools with a larger proportion of students from lower-income families or disadvantaged backgrounds (e.g., deploying more allied educators, such as counsellors and student welfare officers to support these students), as well as intervening early and uplifting children from birth and early childhood as key policy movements. We recommend that such policy movements should also consider the types of post COVID-19 education shifts that might happen. For example, shifts to online/digital media and home-based learning means that more disadvantaged children will have to assess education from their home environment, where background and family factors may start to matter a lot more, as compared to attending school physically where other support systems are in place. Policies should consider how professional

support can be best extended to disadvantaged students when they are learning from home.

Also important to note from a top-down approach is how the mental well-being of all children can be taken care of during such shifts to blended learning. During the circuit breaker, Tinkle Friend, a mental health helpline for primary school pupils received 208 more calls than the previous month, where many children were concerned with managing online schoolwork and losing their friends (Goh, 2020a). Similarly, Touchline, a helpline for youth-related issues experienced an increase in calls during the circuit breaker, and Limitless, a charity which helps youth with mental health issues, has also seen an increased demand for help (Goh, 2020b). Psychologists explain that children thrive on routine, so the disruptions brought about by the pandemic are stressful for many. Children and youth may also experience increased levels of anxiety related to COVID-19 issues, such as lack of personal space and family issues. While these trends were observed during the full-scale nationwide lockdown that has passed in Singapore, it is possible that mental health issues will continue to affect children and youth in Singapore in the future. The pandemic may be around for a long time, and the shifts towards the blended-learning model might further disrupt schooling routines or exacerbate issues of personal space and family issues when students stay at home for longer periods of time for home-based learning. There needs to be adequate systemic support to protect the well-being of our students and to help them through such shifts. From a long-term perspective, perhaps education needs to incorporate socio-emotional skills and awareness amongst students and encourage them to seek help if they face struggles within the home environment.

## 10.10 Conclusion and Remarks

In conclusion, Singapore's principles of science and social responsibility undergird a successful management of the COVID-19 pandemic, and the same principles were applied to the education system. Science informed measures to protect the health and well-being of students, and strategies to ensure continuity of learning and engagement were also executed in a scientific and methodical manner. In schools, teachers also emphasized the importance of social responsibility during COVID-19.

Altogether, we perceive that some of these successes can be due to the unique attributes of Singapore's governance, which contains centralization, multi-ministry coherence, and a legacy of evidence-based policymaking, all in which were especially useful during the COVID-19 crisis. Existing systems and the types of education that occur daily before the pandemic also made swift responses possible. One example



is how teacher education had already incorporated technological skill-building pre-COVID-19, as mentioned above. Another example is how the value of social responsibility is very much ingrained in our culture and total defense education,<sup>2</sup> such that citizens do perceive the importance of social responsibility measures during the pandemic. There is also a strong trust in authority and compliance to rules and measures.

Although there are limits to a total centralization approach, such as lacking eyes on the ground to support those who fall through the cracks, the Singapore model does not hope to become entirely centralized. Instead, it aims to be uniquely balanced in all areas. Our political model is a balance between authoritarianism and democracy, or freedom and social constraint. Similarly, we hope to achieve a balance between centralization and decentralization, such that as we can support the nation as a whole, we are also able to efficiently identify and support those that are most vulnerable. For example, MOE moved towards a cluster management of schools in 2006, which is a move towards decentralization, but improved efficiency in systems on the ground.

Nonetheless, the COVID-19 pandemic has left an indelible mark on our lives, generating long-term changes for society and education. To prepare for future transformations, Singapore has many struggles to overcome. However, a beneficial consequence of the crisis is that the pandemic has made many related issues visible and thus accelerated the shift of Singapore's education system to become more suitable for the twenty-first century. We anticipate that the same kind of changes will also surface more broadly in education systems globally.

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<sup>2</sup> Social Defense is one of the six pillars of Total Defense in Singapore. Social Defense emphasizes the need to build strong relationships across all groups in Singapore and the importance of staying strong and united during challenging times by looking out for each other without self-interest.

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