

FROM DIGITAL EXCLUSION TO UNIVERSAL DIGITAL ACCESS IN SINGAPORE

Irene Y.H. Ng, National University of Singapore

Lim Sun Sun, Singapore University of Technology and Design

Natalie Pang, National University of Singapore

Daphne Lim, National University of Singapore

Gena Soh, National University of Singapore

Pavithren V S Pakianathan, Singapore University of Technology and Design

Benjamin Ang, Internet Society (Singapore Chapter)

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Executive Summary

This document outlines the problem of digital exclusion in Singapore, defined as the lack of or sub-optimal access to the internet be it due to (i) inability to acquire and maintain appropriate devices, (ii) inability to link to internet connections, (iii) not having essential online skills or (iv) a combination of any or all these factors.

It identifies communities in Singapore that have experienced or are currently experiencing some form of digital exclusion and illustrates how the exclusion is felt at the ground level. These communities include low-income students, low-income adults, the elderly, and migrant workers.

Put together by academics, social service agencies and volunteer groups that have been involved in bringing digital resources to needy communities during the Covid-19 pandemic (See Annex B for list of supporting agencies and persons), it highlights gaps, lessons and suggestions in equalizing access to the three necessary digital resources of (i) computing devices, (ii) internet connection, and (iii) digital literacy. These culminate in recommendations that aim for universal access, i.e. making digital access more automatic and affordable.

For devices, applying the principle of one person to one device and one learner to one laptop, recommendations include:

- Incorporating laptops into schools' book lists every three or four years
- Weaving digital subsidies into the MOE and ComCare financial assistance schemes
- More public education campaigns promoting digital devices as life essentials
- Providing laptops for adult training
- Requiring employers to provide smartphones to foreign workers
- Accelerating MOE's National Digital Literacy Programme, prioritizing schools with larger proportions of students from low-income households
- Extending tele services in existing third places and large foreign worker dormitories

For internet connections, recommendations include:

- Establishing broadband connection in old rental blocks without such infrastructure
- Working with donors to provide internet connections to public rental blocks and low income households
- In all future implementation plans of new technology, first consider how economically disadvantaged populations and neighbourhoods are to be connected first

Recommendations for digital literacy include:

- Offering digital literacy to both students and their parents
- Expanding the Digital Ambassadors (DAs) initiative by: (i) extending the services to low-income adults, and foreign workers and spouses, besides elderly and hawkers; (ii) training DAs with insights from low-income, elderly and foreign communities themselves, and from professionals and volunteers who work with them; and (iii) exploring more pro-active engagement
- Mentoring digital learners for a period of time
- Mobilizing DAs from low-income, elderly and migrant individuals themselves, and from students and youths
- Working with social service professionals in reaching out to and sustaining engagement with digitally-excluded clients

- Investing in language inclusion and greater user-friendliness of online government and banking services to digitally excluded populations such as elderly and foreign workers
- Extending Govtech's Digital Service Standards beyond government services to other essential services such as financial, health and social services.

While recognising Singapore's commitment and strong efforts in digital inclusion thus far, the gaps spotlighted by Covid-19 have taught us that reaching the most digitally vulnerable takes more than making programmes available. It also requires social and business knowledge on top of technical knowledge. IMDA therefore needs the close collaboration of MSF, MOE and MND to reach low-income students and working poor households, and MTI and MOM to reach foreign workers and businesses.

The current progressive and redistributive efforts need to be kept up so that any initial push (propelled by Covid-19) can be productively built upon. A more sustainable funding model for our national digital inclusion efforts could be one that includes a public-private funding mix. In this digital age, Big Tech companies have been able to leverage vast troves of user data for profit generation. Beyond imposing general taxes on them, requiring them to contribute directly to full digital inclusion is fair. It is time to rebalance access, because digital access is a necessity for everyday life and a vital conduit for social mobility.

Introduction

Singapore has among the highest digital coverage in the world. The Infocomm and Media Development Authority (IMDA) reports that 89% of resident households have access to a computer, and 98% have access to the internet (IMDA, 2019). However, these statistics do not tell us about the ownership, duration or quality of the access, and Covid-19 has unearthed different ways that various disadvantaged groups lack digital resources.

When the Circuit Breaker led to home-based learning (HBL), many low-income students did not possess the necessary computers and/or internet access connections to engage in HBL. When safe distancing and work-from-home (WFH) required mobile applications to be downloaded for payments and transactions, older persons struggled to know how to do so and unknowingly busted data plans. When applications for social assistance and engaging with case workers went online, low income clients struggled to have the platforms, privacy and knowledge to make use of the online tools. Overnight, Social Workers had to double up as IT support officers.

It is now widely acknowledged that Covid-19 has accelerated digital adoption. Post-pandemic, digital usage will no longer be a choice but has become, and will continue to be a need, not a want. Yet, as the examples above show, this means that individuals and households who lack the digital resources and know-how will be left further behind. They will also be subject to greater online risks. Although their numbers are not sizeable compared to other countries, the 10% of our population who are digitally excluded will be more isolated and underprivileged as the rest of Singapore speeds along the digital highway.

Thus, as digital inclusion becomes a key national priority, the urgency is in getting all in Singapore on board, especially those who are already disadvantaged. This demands a paradigm shift towards viewing digital resources as public utilities that should be universally provided by governments, like piped water and electricity. Otherwise, in a world where inequality is already high, digital inequality will become a source of social divide and an impediment to social mobility.

This paper therefore recommends ways to make digital access universal, i.e. affordable and easily available. It recommends ways for helping the following four needy communities to go digital: students from low-income households, elderly, low-income adults, and migrant workers. The challenges and recommendations covered in this paper also broadly apply to persons with disabilities (PWDs), but for recommendations specific to PWDs, readers should refer to Goggin & Zhuang (forthcoming).

Intentional and tailored efforts are required to reach these disadvantaged groups because general digital inclusion methods such as public notifications and online forms will likely miss them. The paper will highlight gaps, lessons and suggestions in equalizing access, culminating in recommendations towards universal access to the three necessary digital resources of (i) computing devices, (ii) internet access, and (iii) digital literacy.

This is a jointly crafted document arising out of collaborations from different sectors of society including academia, the social service sector, civil society groups and interested members of the public. It was born out of a collective interest to capture and articulate the experiences of the digitally excluded, and to offer a solution to addressing their needs in an effective and sustainable way. Annex B lists supporting agencies and persons.

Digital Devices

Singapore is one of the most digitally-connected nations in the world and our digital transformation plans are among the most ambitious. In 2018, a Digital Readiness Blueprint was announced ([Ministry of Communications and Information, 2020](#)), from which a set of Digital Services Standards was initiated ([Govtech, 2020](#)). However, these plans need to be more progressive; more of the resources committed to digital transformation need to be channelled towards getting on board the least digitally ready. Failing which, the digital divide will widen existing inequalities.

Challenges

Students from Low-Income Households

The sudden digital gaps revealed due to Covid-19 have offered precious learning points to accelerate digital inclusion plans. The NEU-PC Plus programme, which offers households with a student or a PWD a subsidised PC and broadband, has been in place since 1999, and has helped more than 63,000 beneficiaries (IMDA, 2020a). This has no doubt resulted in the high PC ownership rate of 89% (IMDA, 2019). However, the scramble to loan and donate laptops to many students without a PC when the Circuit Breaker required HBL clearly underlined that many households who need PCs still lacked them. Besides the 12,500 PCs and tablets that MOE loaned out (Ang, 2020), ground efforts such as Engineering Good provided more than 3,000 refurbished laptops as of November 2020, while Bridge the Digital Divide provided another 400. With donations from Facebook, TOUCH Community Services loaned out 500 new laptops to their clients and distributed another 500 to other agencies.

Reasons for Inadequate Device Ownership

Based on our discussions with groups that worked to meet these needs, there were several reasons for the device shortfalls.

First, some people did not know of the existence of IMDA's programmes.

Second, some households who needed the laptops did not meet the criteria. IMDA has since relaxed the criteria, e.g. permitting a second laptop for households with three or more school-going age children and waiving the community service requirement for additional subsidies. These relaxed criteria were in effect until December 2020.

Third, some people who knew of IMDA's programmes did not apply. Some are hampered by the stringent criteria and conditions. Others are deterred by the challenges of accessing and completing the necessary paperwork. For example, NEU PC Plus is offered through schools, thus needy students have to first be aware of the scheme, and then take the initiative to request the application forms from the school. Given such a 'pull' model, the additional effort coupled with the stigma and embarrassment of applying could discourage the students who most need the programme from coming forward. Instead, a 'push' model where schools proactively identify needy families from their database to ascertain their digital access needs before facilitating the application process would be far more ideal.

Other households simply did not see the need for device support. Lower income households tend to be mobile-only or mobile-first, where due to their digital illiteracy and financial constraints, prefer to rely exclusively or primarily on their mobile phones for internet access (Lim & Loh, 2020). This is therefore a chicken-and-egg problem, where people who do not own PCs do not see the need for

them, and people who do not see the need for PCs do not own them. Digital literacy is therefore critical as part of the solution to improve digital ownership. At the same time, digital ownership can itself be an important way to improve digital literacy (Tallvid et al., 2015). Raising awareness among the low-income about the importance of ownership of devices that best facilitate learning is thus vital.

In addition to the above reasons for NEU PC Plus not reaching many families in need, ground feedback suggests that the speed with which households can obtain laptops is slow. The application process is protracted with each request having to be assessed through schools, MOE headquarters and IMDA. We recognise that checks and balances for government programmes are necessary but urge greater nimbleness. For needy households to become fully digital like the vast majority of Singapore households, we can distil key lessons from the responses during the Circuit Breaker to streamline and speed up current device support programmes.

The challenges highlighted above can be extended to funding for assistive technology for PWDs, e.g. [the Assistive Technology Fund and the Special Education Needs Fund](#) (SG Enable, 2019). Thus, steps to increase awareness of these funds and ease their access must be further considered.

Device Donation Schemes and Their Limitations

Voluntary efforts such as Engineering Good and Bridge the Digital Divide have been crucial to plugging the gaps but are at best a short-term ‘band aid’ solution. While these programmes’ donated refurbished laptops plugged an urgent gap during the Circuit Breaker, they also revealed some inherent issues with such schemes. Refurbished laptops tend to have shorter lifespans and require software updates that users are unaware of. Already, some of the donated laptops distributed during the Circuit Breaker have malfunctioned and required replacement. A more sustainable eco-system of affordable laptops suggested by Johann Annuar, Executive Director of Engineering Good, would involve a combination of IT support and literacy skills to enable users to update and repair laptops by themselves.

Because refurbished laptops may only be able to run outdated software, they also pose a cybersecurity risk as the software would not have current security patches, making them vulnerable to malware or infiltration by threat actors. When these laptops are subsequently connected to school or business networks, the malware or threat actors would be able to enter those networks and carry out cyberattacks, cyber espionage, or cybercrime. Such laptops are thus weak links that undermine the integrity of these school and business networks.

At the other end of the continuum, new laptops on loan faced another issue. Low-income families did not dare to use the laptops for fear of damaging them and having to suffer adverse consequences. Such reservations are understandable given that these families are already feeling the strain of financial pressure and do not wish to bear the responsibility of repairing a high-ticket item such as a laptop. They are also likely to be less well-educated and unaware of the benefits such devices can confer on their children’s learning and instead make an expedient choice. This is yet another facet of digital literacy that public outreach campaigns must address.

Low-Income Adults

For households without a student or PWD, IMDA’s Home Access Programme (HAP) offers bundled options for fibre broadband with a tablet or smartphone. This programme can benefit elderly persons and other low-income adults. Since it started in 2014, HAP has helped more than 14,000 beneficiaries (IMDA, 2020a).

However, one salient gap with regard to devices surfaced through our focus group discussions. HAP does not cover laptops, but laptops are required for some essential transactions, e.g. banking and adult learning. Smartphones cannot quite fill the gap when it comes to websites that are not mobile-friendly or mobile-compatible or that require navigating multiple windows. With SkillsFuture encouraging lifelong learning, and many training programmes being conducted online, adult learners will need laptops to keep up with classes. This is even more so for courses focused on digital skills that are in rising demand. Computer ownership is thus essential for low-educated adults to broaden their skills sets and remain employable in a digitalising economy. Lack of computer ownership will therefore hamper their skills upgrading efforts, thereby greatly limiting their career options and advancement. Furthermore, with the rise in work from home arrangements, providing low income adults with laptops can enable them to apply for remote, shift or part-time work e.g. data-entry, data validation, survey completion or content moderation. Such work would be especially valuable for those who also shoulder the caregiving burden at home. For those with home businesses, the laptop also provides greater functionality than smartphones for interfacing with customers, managing transactions and enhancing the business's online presence.

Under the current set-up with NEU-PC and HAP, perhaps the population that is most left out of existing programmes are low-income parents with children of school-going age, since they are ineligible for both NEU-PC and HAP (see Case Study 1).

Case Study 1: Urgent Need for Laptop Met by Engineering Good

In November 2020, a volunteer with the Family Development Programme by the Methodist Welfare Services (MWS FDP) learned about a family's urgent need for a laptop. Devi (pseudonym) had registered herself for a SGUnited course on Infocommunications. This initiative to upgrade her skills is exactly what our SkillsFuture movement encourages. Yet, Devi suddenly found herself without a laptop to attend her classes via WebEx when the primary school semester ended. She had been using a laptop on loan to her primary 3 child, which had to be returned now that the semester had ended. In desperation, she asked her volunteer for help. The volunteer quickly sought permission from MWS and submitted an application for a laptop with Engineering Good. This was over the weekend, and by Friday that week, Engineering Good informed the volunteer that the laptop was ready. The volunteer duly collected the device and passed it to Devi on the same day.

Besides highlighting the responsiveness of community support in meeting a digital need, this case also illustrates the necessity of a universal one-to-one approach to digital access. Devi falls into the group that is outside our existing digital inclusion programmes. Yet her experience demonstrates that it is exactly low-income workers like her who need to be covered by digital inclusion programmes if our national drive towards reskilling is to help such workers remain employable. Furthermore, the loan-based, on-and-off nature of her children's laptop access also results in discontinuous laptop use, which will hamper the family's ability to boost its digital capabilities. Sustained long-term access will offer better conditions for learning and upskilling.

Migrant Workers

Universal digital access will not be universal if Singapore's large migrant worker community is excluded (As of March 2020, there were 720,800 work permit holders, excluding foreign domestic

workers (Lim, 2020)). With digital use having become a need and norm in Singapore, and migrant workers playing such a significant role in our economy, excluding them from digital access is both misguided and risky. As Kathy Teo of Bridge the Digital Divide explained, when any group within our community are without digital resources and know-how, such that they are susceptible to cyber scams and attacks, or lag in responsiveness to emergencies such as the current pandemic, our society will only be as strong as our weakest link.

During the Covid-19 pandemic, mobile apps have become essential for migrant workers for health declaration and work movement management to facilitate contact tracing. Online banking and money transfers have replaced physical banking. However, mobile banking apps function slightly differently from other apps as they are often developed to be more sensitive to security issues and designed to work with newer mobile operating systems. Yet, as with the elderly, many migrant workers may not own smartphones, or if they do, a large proportion own older devices that are defective or outdated such that newer apps cannot be installed nor function properly. These struggles can impact their instrumental need to send money home to their families and impact their overall well-being.

Bridge the Digital Divide is embarking on a “Phone is Lifeline” campaign to collect donated smart phones for migrant workers. This initiative will plug an important gap. Going forward, however, more coordinated national, employer and business efforts towards shoring up the digital readiness of migrant workers need to be made, including not only smartphone access but also careful attention to software and interface issues.

Recommendations on Digital Devices

After months of conversations with the people involved in ground up initiatives to provide digital resources, our conclusion is that smartphones AND laptops have become necessities in a digitalising country like Singapore. As such, means-tested and conditional approaches to allocating digital resources will lead to distribution leakages and under-adoption that will translate into digital inequities. Instead, we propose a universal approach that makes device access default and automatic, thereby also removing the administrative burden of means-testing. We also propose one-to-one access to laptops for all learners, and more widespread availability of laptops to other adults including migrant workers. To plug any remaining gaps, we also propose the introduction of more comprehensive communal tele-services.

Students

MOE has brought forward the target date for one-to-one laptop provision for all secondary school students to 2021, seven years ahead of schedule. We urge the quick extension of one-to-one laptops to all school-going age students including those in primary school. This can start with a subsidised basic laptop listed as part of schools’ book lists in primary 1, with students who wish to purchase higher end models forgoing the subsidy to purchase their own device. Instead of an additional application through NEU-PC Plus, further subsidies for laptops can be built into the MOE financial assistance scheme (FAS). Laptops can be included in book lists every three or four years, which is the current estimated shelf life of new laptops. Schools should also set up a standard software configuration for the laptops that meets basic cybersecurity needs.

Low-Income Adults

For adults, those from low-income households may perceive having smartphones and computers as luxuries, and when they acquire smartphones these are often gifted or are purchased second-hand. Some of these devices may have compatibility issues with newer apps, as well as apps that require heightened security and controls (e.g. banking apps).

ComCare beneficiaries are currently automatically included in the HAP for smartphones and tablets. However, beneficiaries still need to be aware of HAP and to apply for it, and it appears that SSOs do not actively refer beneficiaries to the programme. With the switch to treating digital resources as necessities and not luxuries, the application for digital resources can be woven into ComCare computation of needs for applicants. IMDA and SSOs can work together to merge the application process.

For non-ComCare beneficiaries who nevertheless need subsidies to afford a smartphone or tablet, greater public education campaigns promoting them as life essentials together with simplified application processes can accelerate the sign up of greater masses of people, especially the elderly. Similarly so for access to assistive technology funds for PWDs.

Overall, with one-to-one access as the principle, the HAP should be replaced by a programme that is individual based rather than household based.

The HAP provides only smartphones or tablets, but as already mentioned, laptops are the ideal devices for online learning and adult learners in particular need laptops. Similar to our proposal for school-going age students, a laptop can be worked into course fees and requirements for multi-year courses. For short courses, loans or donations of refurbished laptops can be provided to adult learners. In both cases, easy access to application for subsidies should be provided if necessary.

All in all, the above steps to include laptops in book lists, MOE FAS, ComCare and adult training resources make access to laptops more default and automatic rather than regarded as optional extras.

Migrant Workers

For migrant workers, in order that migrant workers can abide by the necessary reporting requirements and digital banking, employers should be required to provide smartphones with subsidized support from the authorities.

Communal Tele-Services

A sustainable solution for digital access for all must go beyond initial device access. We propose that one solution could be to build on existing third places--as coined by Oldenburg (1989) to refer to places other than the home and workplace--and expand the capacity of these places with tele-services. We already have many such third places in Singapore that members of the public frequent. Libraries, community centres, void decks and even parks, are places that people are already using, not just for instrumental purposes (e.g. borrowing a book) but also to meet people. Such venues can be boosted with tele-services to enhance the support they provide, thereby augmenting their ability to foster community interaction and forge social bonds.

Tele-services can include support for maintenance and repair of digital devices for a nominal fee, digital education, loans of laptops on-site such as when one's laptop is malfunctioning or for people who do not own laptops. More advanced computing needs such as strengthening cybersecurity,

design and printing can also be explored as the services gain traction. The provision of such tele-services could also be an opportunity for new jobs or start-ups, and they are distinct from existing service centres or tech shops as they would be working in collaboration with existing services in these places, be they library or community programmes.

Libraries to some extent already provide the above services. Library services are, however, currently limited to information support, whereas the telecentres that we are recommending are technically-oriented, to support sustained digital usage by all. They are necessary because low-income households might not be able to afford private repair services or a new laptop should the defective device be irreparable. They can also be welcoming spaces for the elderly and migrant workers to use computers as well as seek assistance for essential transactions such as banking or government services.

All tele-services should be manned by a technically trained person, and be well-resourced. Here, the expertise and networks of organisations such as Engineering Good and Bridge the Digital Divide can be tapped. Refurbished laptops from units that are decommissioned by organisations can be a source of the replacement laptops provided through these centres. Device maintenance and care skills can also be offered in these centres, such as Engineering Good's plans to teach digital skills to troubleshoot and repair one's laptop.

While these community-based tele-services should be open to all, including migrant workers, such services could also be introduced in migrant workers' dormitories. Tele-services should be added to the list of other necessities such as kitchens, toilets, washing machines and recreational spaces in dormitories. However, there must be sufficient resources deployed to support such tele-services, failing which overwhelming demand may lead to other problems.

Similarly, if schools are providing students with laptops, there needs to be greater technical support in schools, beyond the existing staffing whose role is focused on the digital resources in the school and not those of students. MOE's National Digital Literacy Programme (MOE, 2020) includes IT support centres in schools by 2028. This should be accelerated, and schools with higher percentages of students from low-income households prioritized. Ranganayaki Thangavelu from Beyond Social Services gave the example of dental nurses in schools as one way of thinking of such technical support.

Overall, the addition of tele-services alongside social and community services sends a strong signal that digital services are now prioritized on par with the other services already being offered in community spaces.

Internet Access

Challenges

The extent and quality of internet access currently experienced by the digitally excluded are undesirable in various ways as starkly revealed by the Circuit Breaker period when most people were homebound. Principally, costs and inadequate infrastructure are the main obstacles to an optimal state of internet access.

It would be fair to say that home high speed internet with Wi-Fi access is the most ideal form of internet connection because it provides virtually unlimited connectivity that enables one to fully exploit the internet's synchronous and interactive multimedia capabilities. Without bandwidth, data or time limitations, a user would be able to surf the internet at one's leisure and convenience in one's personal domicile for as long as one needs. Such a level of access is ideal for students in particular if they need to go online to get acquainted with the internet's full spectrum of content offerings, and to use interactive learning platforms that provide instant feedback. For adults in general, be they the elderly, persons with disabilities or migrant workers, it would mean being able to view online videos to pass the time, to use online platforms to acquire new skills and to use social media platforms or engage in online video calls with loved ones to feel a sense of connectedness.

For the digitally excluded, their internet access is at best intermittent and sporadic with bandwidth, data and time limitations being especially pronounced. They use public free Wi-Fi via Wireless@SG at malls, libraries and community centres, or free Wi-Fi offered by eateries and other commercial establishments. While such public access is free and forthcoming, they are available only during opening hours of the establishments. The physical settings in which to tap into them are also not always ideal for studying, attending online courses, conducting secure transactions or making calls of a personal or private nature. Students for example may need to spread out their school textbooks, worksheets and laptops across a table to best use the internet for study purposes. Similarly, the elderly may not find it safe to complete financial transactions in a public place if they need to refer to their personal banking documents. Persons with disabilities would also find it challenging to locate public Wi-Fi access in spaces that are also disabled friendly and easy to get to.

Ultimately, in order for the digitally excluded to be fully on board Singapore's digitalisation journey, affordable home high speed internet with Wi-Fi access is the goal to strive for. Mobile data via smartphone subscriptions or pre-paid plans, or via dongles have data ceilings and bandwidth limitations/speed throttling that do not permit concurrent access by several household members. Such a situation undermines the use of the internet for educational purposes since households with multiple children and working adults accessing the internet at the same time would have to decide for whom internet access should be prioritised. Students and adult learners may also find themselves unable to complete the necessary learning activities within the allocated time and data ceilings.

Cost-wise, home Wi-Fi subscription plans are also priced beyond the reach of many low-income families with an added complication that some rental flats housing the low income do not have fibre optic points for easy Wi-Fi installation. IMDA's NEU-PC and HAP include internet access, but as was discussed in the previous section on digital devices, such means-tested programmes lead to gaps because people might not know to apply, might not want to apply, or might not qualify. With digital access now a necessity, high speed internet connection should become a public utility like electricity and water.

Recommendations on Internet Access

Due to the large scale of investments involved, building the infrastructure for all to have internet access clearly requires government intervention. With older rental apartments that lack fibre optic points, we need to explore other options such as paying telcos to set up Wi-Fi routers and build the cost of such installation into the rental fee or through corporate donations. Another less costly alternative is to offer Wi-Fi at void decks of such rental blocks and we discuss one such trial in the case study below. For migrant worker dormitories, we can consider how to extend the current Wireless@SG network.

Based on an ability-to-pay principle, the authorities could seek donations from corporates to fund Wi-Fi access of public rental blocks and low-income households, such as through adopt-a-block or adopt-a-household programmes.

As new technology (e.g. 5G) emerges, full digital inclusion should be adopted as a principle for all future implementation plans, such that planners must first consider how economically disadvantaged populations and neighbourhoods are to be connected first before any roll out.

Case Study 2: Kebun Baru Void Deck Wi-Fi Project by Bridge the Digital Divide & Beyond Social Services

This programme aims to provide internet access to the low-income community living in government rental flats, beginning with blocks 244 and 245 at Kebun Baru. At these blocks, free Wi-Fi has been provided at the void decks since September 2020, outfitted with a study and elderly corner to benefit the youths and elderly. The decision was made to utilise the void deck because it is where residents connect within their community and where the free Wi-Fi can be most easily accessed.

This scheme required the collaboration of multiple parties. A ground-up initiative Bridge the Digital Divide (BTDD) provided sponsorship for the installation of Wi-Fi routers and subscription. Beyond Social Services (BSS) worked the ground to identify the community's needs. It also worked with the Town Council to facilitate installation and to conduct outreach to apprise the residents of this service.

Currently, the leaders of this project recognise that there are limitations as to what the residents can do with the free Wi-Fi if their digital skills are limited. Hence, even elderly residents who own smartphones may not realise how they can tap the free Wi-Fi to avail of more online content and services. Students may also be using the free Wi-Fi without the necessary adult guidance or supervision regarding online content that is age appropriate, beneficial and edifying. It is also unclear if students who use the facility already have Wi-Fi at home. However, BTDD and BSS do not have the necessary resources to provide such training or even to track the usage of the free Wi-Fi to understand how, how much and how effectively it is being used by residents.

Engineering Good is also building on the work of Bridging the Digital Divide and running a pilot to provide block-wide WiFi to two blocks, one in Boon Lay and another in MacPherson.

Digital Literacy

Singapore has long recognised the importance of digital literacy, and in March 2020, the Ministry of Education (MOE) introduced the National Digital Literacy Programme targeted at students at all levels, from primary to higher education. For those who are digitally excluded, however, there is a circular problem. Those who do not own computing devices struggle with understanding how to use these devices, and those who do not know how to use them are reluctant to gain access or ownership at all, sometimes due to anxieties or fears about new technologies. The issue of digital literacy is therefore a fundamental one, as it has implications for access as well as one's ability to sustain the usage of devices over time in a productive and meaningful manner.

Inequality in digital literacy also poses two national security risks. Firstly, digitally excluded persons have less knowledge of basic cyber hygiene and cyber safety when they start getting online, which exposes them to threat actors (such as cyber criminals or nation states), who can exploit them through scams, fraud, or data theft. In our interconnected digital environment, these threat actors will target them as the weak link to infiltrate networks, because the threat actors can then use lateral movement across networks to reach more lucrative victims like businesses or government officials. Secondly, digitally excluded persons also have lower digital media literacy when they start accessing information online, which makes them vulnerable to misinformation, disinformation, and manipulation. For example, they need to be warned about online falsehoods that carry extremist religious content, or racially chauvinistic content, which could otherwise cause self-radicalisation.

Therefore, in this section, digital literacy includes not only knowledge in the functional use of digital resources, but also cyber safety, so that individuals who are newly online are not easily exploited by cybercriminals, and digital media literacy, so that they can learn how to evaluate online information critically, especially to identify online falsehoods that spread through social media and messaging tools.

Challenges

Students from Low-Income Households

Students from low-income households may find support via the National Digital Literacy Framework (MOE, 2020). Besides outlining infrastructure for IT support, the framework also looks into resources and programmes to support students in acquiring digital literacies, raise awareness about cyber-wellness as well as offering computing subjects at the secondary level and above (See Annex A). However, given that there is an unequal distribution of resources across schools and every school is responsible for crafting its own digital literacy program, more attention could be paid to equitable implementation.

The gaps in digital literacies were especially apparent when Singapore entered the Circuit Breaker and all schools had to turn to HBL. Students, especially those from low-income households often had parents or caregivers who were either working in essential services or did not have adequate digital literacies to support their learning. This included knowledge gaps involving troubleshooting problems associated with using digital devices, live conferencing (e.g. Zoom, Google Classroom, resolving microphone and camera problems), Internet connection issues, as well as knowledge about uploading or submitting homework and assignments digitally.

Beyond literacies about using digital devices for learning, students are also especially vulnerable to online risks such as searching the Internet without sufficient parental controls or mediation, over-

disclosure and cyberbullying. While there has been much effort by schools to raise awareness about cyberbullying to promote responsible online behaviours, more can be done to improve digital literacies about privacy and other risks which may also be app- or platform-specific.

Students can be blasé about cybersecurity risks, mistakenly believing themselves to be invulnerable or at least resilient to cyberattacks or data breaches. However, as Work from Home and Home Based Learning overlap and both parents and their children use the same home network extensively, the cyberattacks or data breaches suffered by students can also spread to their parents, and by extension their parents' employers or businesses.

Low-Income Adults

For low-income adults, some face difficulties regarding application for government services or assistance. These include online application processes for digital access programs such as the HAP or NEU PC Plus for their children. Others include general services such as setting up employment-related appointments with Employment and Employability Institute (e2i) and Workforce Singapore (WSG), or financial assistance application through ComCare or the COVID-19 Temporary Relief Fund (TRF). The former required online booking of appointments even before the Circuit Breaker, and the latter commenced during the Circuit Breaker to enable needy individuals to apply for financial assistance without visiting a SSO. However, low-income adults who are mobile-first or mobile-only may not be comfortable with email correspondence or filling up digital documents. Furthermore, they may not have access to printing and scanning services which are often necessary to show proof of documents to apply for assistance.

Additionally, they also face challenges in digital communication with teachers and schools regarding their children's education, or in supporting their children through home-based learning. These low-income parents who are not familiar with using computers struggle to resolve IT problems for their children when needed. Low-income adults might also face challenges in finding and attending online courses, applying for jobs online and might be hesitant to seek employment that includes work-from-home arrangements that require digital connectivity.

Since the Circuit Breaker period, social workers have been supporting low-income families with their digital needs. Where parents were unable to help their children or could not apply online for assistance, social workers provided support in these areas. Some social service agencies mobilised their volunteers to give basic help and troubleshooting to families. However, these agencies are unsure of the sustainability of relying on volunteers for this and see the need for partners with greater IT expertise. Some examples are given below.

During this period, TOUCH Community Services has begun a program to improve digital literacy for low-income families. Their program is open to anyone and automatically includes families who have received laptops from TOUCH. Through the program, a family ambassador is attached to each family for additional guidance and support throughout the learning process. Beyond Social Services taught adults and children basic digital skills like how to use a laptop and specifically supported children in using technology for school. Engineering Good has plans to train people in maintenance and repair of their own laptops and devices, to prolong the usage and lifespan of devices.

Seniors

Seniors, especially those from low-income households and/or who live alone, often face issues associated with both access and literacy. Having access to digital devices does not always translate

into sustained use, as the lack of digital literacy can prevent them from having enough confidence and efficacy to explore and pick up new digital literacies. The situation is compounded especially for older adults who live alone or who have very minimal support networks to help them gain digital literacies. For example, seniors are often confused and unsure of various mobile plans offered by competing service providers. They lack clarity on the terms of service such as the amount of minutes or data they are entitled to. As a result, some exceed their allotted data limits and rack up large sums of arrears while others choose to not use mobile data or their mobile phones at all out of concerns about the costs. Additionally, some seniors-only mobile plans are not easily accessible to seniors due to their application process which is fully digitised. Seniors might also rely more heavily on mobile data as they may lack Wi-Fi connections at home, especially if they live by themselves. This makes them more likely to use large amounts of mobile data (which tends to be priced higher) or to unknowingly exceed their data limits.

Language accessibility is another issue for seniors. Currently, the SG Digital Office and Seniors Go Digital initiative present seniors with digital resources in multiple languages. However, seniors who have completed the training and wish to use apps such as SingPass and banking apps can only access them in English, instead of their preferred language. Practitioners have encountered this issue with seniors and are unable to support them as most digital platforms are currently only available in English, which not all seniors are fluent in.

Another consideration is the problem of privacy and security regarding seniors' use of online banking and government platforms. Seniors face the problem of regularly forgetting their passwords or login details. However, as they turn to others for help, they might be subject to exploitation and fraud. Alternative technology that can both safeguard seniors' identity while allowing ease of functionality can be more deeply looked into. For example, one social worker brought up the QR code login method via SingPass as something easier for seniors to use, as it allows users to log in to SingPass without the use of a password. However, this is limited to the SingPass mobile application and does not include other platforms such as internet banking.

In response to the issues facing seniors, IMDA (n.d.) has launched the Seniors Go Digital initiative aimed at providing a variety of ways to support seniors to gain digital literacies. Three tiers of digital skills are identified: tier 1 is aimed at improving digital communication skills, where seniors would learn about basic communication tools, messaging and making video calls; tier 2 is focused on digital government services where seniors would learn all about using SingPass to access digital government services as well as SafeEntry; and tier 3 would bring seniors on board online transactions such as e-payments and digital banking.

As part of the Seniors Go Digital Initiative, IMDA has deployed more than 1,000 Digital Ambassadors to teach digital skills to seniors, including helping many seniors who work as hawkers with Hawkers Go Digital. Digital Ambassadors are usually stationed at SG Digital community hubs such as community centres or deployed to hawker centres. This brings them closer to communities and individuals.

However, some seniors may not be ambulant while other seniors or may be staying in institutional care like nursing homes. These seniors are not able to visit SG Digital Offices as easily and miss out on the opportunity to learn skills from Digital Ambassadors.

Even for ambulant seniors, if usage of digital devices is not part of their life, seniors might not come forward to seek help from Digital Ambassadors, leading to the circular problem where seniors who most need to know how to use digital devices do not seek help. The availability of online resources

and training results in another circular problem where the target learners are seniors who lack the digital skills to know how to access the online training in the first place.

It appears then that for greater reach of seniors into the digital world, there need to be greater efforts to actively reach out to them, and for consistent follow-up. For example, TOUCH Cyber Wellness, a part of TOUCH Community Services, offered a workshop on smartphone usage for seniors, where they are paired with volunteers on a 1-to-1 basis. However, the seniors did not practise their new skills enough after the training and soon forgot what they had learnt. During the Circuit Breaker, TOUCH Cyber Wellness ran another program where volunteers befriended seniors through their smartphones and coached them on its usage remotely.

Migrant Workers

The issue about digital literacy for migrant workers is often compounded with the issue of language. Many apps and websites are optimised and designed for those who are literate in English. Even if one is able to configure one's device to display other languages, many third-party apps may not have been developed to support other languages. This issue is exacerbated when it comes to more complex apps and transactions such as mobile banking, which is an important service for migrant workers. Mobile banking apps usually require two-factor authentication, but migrant workers struggle with such these heightened security features. Resetting passwords and trying to seek help with two factor authentication can be futile especially with limited language and digital literacy. Volunteers in the dormitories are also unable to assist even if they try – as banks would not and rightfully so – reveal any passwords or instructions without speaking to the account holder.

Besides foreign workers, our discussion groups highlighted that foreign spouses who are non-English speaking also grapple with the above similar issues with online services.

Migrants have to use a number of government applications. For example, FWMOMCare is used by migrant workers to self-monitor or report their health status. The app can also be used to conduct teleconsultations with a doctor within 30 minutes after reporting symptoms. While accessing government services is relatively easy for Singaporeans with SingPass, it is not so straightforward for migrant workers. For SingPass users, there is a single log in, and when one forgets their password, the procedures are relatively easy to understand. Without SingPass, migrant workers have to access government services using multiple accounts and passwords. Understanding how to manage these multiple accounts as well as the risks can create many anxieties for migrant workers.

During the Circuit Breaker, ground up efforts have emerged to support migrant workers via technology. For example, the Covid-19 Migrant Support Coalition (CMSC) provided mental health support, language learning, and familiarization of website resources through social messaging platforms such as WhatsApp and calls. A few migrant workers who are more tech savvy also helped to be a mediator and teacher to their “migrant brothers”. Below, the transcript of our interview with two such migrant workers offers a case study.

Case Study 3: Two Migrant Workers Helping Migrant Brothers Learn to Use Digital Devices to Access Services

This is a transcript, edited for easy reading, of our interview with Tobi and Rauzy (pseudonyms), two tech savvy migrant workers.

Tobi: During Covid19, our handphones are most useful. We use it to order food. Sometimes our boss also buy food for us. Sometimes our brothers* want to send money, but don't know how, so I teach them whatever I know. I don't know too much but I know some things they don't know. So long as I can help, I will try.

Interviewer 1: How do you help your migrant brother if you cannot see them face to face during Circuit Breaker?

Tobi: So my childhood friend call me and ask me how I send money. Then I explain to him how to use handphone. I used 2 handphones to teach – 1 to teach him and then another phone to do the demonstration. I show them while giving the instructions. It's like a video call, and I used 2 handphones to teach.

Interviewer: So you use 2 handphones to demonstrate.

Tobi: Yeah then when I demonstrate to my mama also same thing. You get two handphone. I use one handphone to video call, another handphone to demonstrate.

Interviewer 2: oh wow, that is creative

Tobi: cannot meet my friend physically so this is what I can do.

Interviewer: So do you know many friends with more than one handphone?

Rauzy: We borrow from another one la.

Tobi: Somebody have somebody don't have. If don't have, then just borrow.

Rauzy: We have no choice because we cannot meet face to face. That's why teaching like that is helpful. Then he also can now use the digital device, right. And I can share something about our mental health.

Rauzy: example now Singapore now got rules that I need to use the 3 apps. Trace together, .. sg work pass. FWMOMcare. Every day I fill up this form if got fever, body ills, etc. below have one option. If you are sick, you can consult a doctor using the app. Then one week before I feel like my body is coming sick, and I called the FWMOMCare app doctor. Around 1 hour 30mins later, someone called me at the dorm to say that my medicine is here. You can come down below. I was really shocked about how fast it was.

Interviewer 2: that's pretty amazing. Very fast. Would you agree that for those who don't know how to use this app, it is a problem?

Rauzy: Our biggest challenge is this. 70% of them don't know how to use digital devices. We need to report our health status using the forms in FWMOMCare app everyday ...so many friends and brothers come over ask me help them fill up the form. I say no, I will not fill up for you, if you don't know I can teach you, but you need to fill up yourself. Some people don't understand the questions. Then I explain. This is a challenging problem for us.

Interviewer: Is it because it's all in English?

Tobi: Ya because it's all in English. They don't know how to write, and even if they know how to write, they don't know the meaning.

Interviewer: That's a problem.

Rauzy: for myself I have more education, I graduated. My brothers don't have the education then just working la. But I digital devices, but anytime I can get information any help. But other people I'm not sure if they know how to use.

** Migrant workers commonly refer to each other as 'brothers'*

Recommendations on Digital Literacy

MCI's Digital Readiness Blueprint and GovTech's Digital Service Standards are important starting points for the push towards universal digital literacy. They lay out clear and necessary principles for digital inclusion. For example, the principle of digital inclusion by design in the Blueprint states that "digital initiatives must be designed in a way that makes it easy for everyone to get involved". As we have outlined, the pandemic has revealed ways that apps and websites are difficult for vulnerable groups such as elderly and migrant workers to use. The lessons from the initiatives which emerged during and after the Circuit Breaker offer many useful suggestions for future public-community partnerships in levelling up digital literacy gaps.

For students, MOE can now learn from the gaps made evident by HBL to implement the National Digital Literacy Framework more equitably. Since one limitation of students benefiting from e-learning is their parents' own digital literacy, MOE could consider holding literacy classes for both parents AND children at the same time. It could also encourage the children to teach their parents, and hold focused sessions for parents on tools to protect children from cyber risks. If digital access has become a need, digital education of children must be a key focus of MOE.

The Digital Ambassadors (DAs) initiative can be tweaked in order for it to fulfil the last-mile aims of getting the digitally excluded e-connected. First, the digital concierge service from IMDA should be expanded to low income households, not just the elderly. This reaches a larger pool of beneficiaries with the same resources. Second, training of DAs can incorporate insights from the experiences of low-income, elderly and migrant workers themselves, as well as insights from social service professionals and volunteers who work among them. Third, beyond setting up DA touch points in community spaces, more pro-active engagement, e.g. arranging for DAs to teach elderly in eldercare facilities or migrant workers in dormitories, more outreach to blocks where elderly and lower income households live, can be explored.

Literacy in anything cannot be achieved by a one-time session; it requires continued use and practice, and this in turn requires some level of confidence for the individual to keep using the new technology. As the experience of TOUCH has shown, a mentoring approach for a period of time will lead to more sustained results. This is especially if websites and apps also change quickly.

More manpower, both paid and voluntary, therefore needs to be mobilized as DAs. IMDA can work with community partners to identify and train alternative DAs. For example, peer-to-peer learning can be leveraged by recruiting tech savvy low-income, elderly, migrant workers and foreign spouses themselves to act as DAs. Youths from secondary schools and post-secondary institutions can reach

out to their own families or the elderly through service learning programmes. While social service professionals themselves have filled in the gap to teach their clients how to use technology, it was also evident from our FGDs that they cannot and should not be the manpower tasked to provide digital literacy. This eats into their ability to provide social services—their principal area of expertise, imposes additional workload and is a poor use of human resources. As the people whom clients are familiar with and trust, they definitely should work with DAs, but not be the ones to provide the literacy training.

As digital payment, digital banking and online buying and selling increasingly replace brick-and-mortar services, greater inclusivity must take shape in online portals and mobile apps. Of particular concern are exclusion due to language and rigidities in secure log in, and the three most affected populations include the elderly, migrant workers and foreign spouses. Many platforms are also not disabled-friendly. The sheer size of these populations in Singapore justify investments in offering government and banking online services in their native languages, as well as in secure but easy-to-use log in such QR code and face recognition. Govtech's Digital Service Standards currently cover only government services, and should quickly be extended to other essential services such as financial, health and social services.

Summary

In summary, our recommendations for achieving universal digital access include:

For devices

- Apply the principle of one person to one device; one learner to one laptop
- Include subsidised basic laptop as part of schools' book lists in primary 1 and every three or four years subsequently
- Build application for additional laptop and internet subsidies into the MOE financial assistance scheme form
- Weave application for digital resources into the ComCare computation of needs
- Launch more public education campaigns promoting digital devices as life essentials
- Work laptops into course fees and requirements for multi-year adult courses; loan or donate refurbished laptops for short courses
- With subsidized support from the authorities, require employers to provide smartphones to foreign workers
- Accelerate MOE's National Digital Literacy Programme, prioritizing schools with larger proportions of students from low-income households
- Extend tele services in existing third places with maintenance and repair of digital devices, digital education, loans of laptops; and more advanced computing needs such as strengthening cybersecurity, design and printing
- Tap on expertise and networks of existing tech charities to provide the technical manpower of these tele services and refurbished replacement laptops
- Set up similar tele services in large foreign worker dormitories, ensuring adequate facilities to manage demand and supply

For internet connection

- Urgently work with telcos to establish broadband connections in old rental blocks that lack such infrastructure
- Work with donors to adopt-a-block or adopt-a-household to provide internet connections to public rental blocks and low income households
- Apply the principle of full digital inclusion in all future implementation plans of new technology (e.g. 5G), such that planners must first consider how economically disadvantaged populations and neighbourhoods are to be connected first before any roll out.

For digital literacy

- Through MOE's National Digital Literacy Programme, offer digital literacy to both students and their parents, including sessions for parents on tools to protect children and themselves from cyber risks
- Augmenting the commendable introduction of DAs by:
 - Extending the services to low-income adults and foreign workers and spouses besides elderly and hawkers;
 - Training DAs with insights from low-income, elderly and migrant communities themselves, and from professionals and volunteers who work with them
 - More pro-active outreach at domiciles, institutions and agencies.
- Adopt a mentoring approach to digital education, where the mentor coaches learner for a period of time
- Mobilize more DAs from alternative pools, including low-income, elderly and migrant individuals themselves, and students and youths
- Work with social service professionals in reaching out to and sustaining engagement with digitally-excluded clients
- Invest in offering online government and banking services in non-English speakers' native languages, and secure but easy-to-use log-in such QR code and face recognition.
- Extend the Digital Service Standards beyond government services to other essential services such as financial, health and social services.

Conclusion: Necessity of Cross Collaborations and Public-Private Funding for Sustained Digital Inclusion

The government's commitment to nation-wide digitalization is clear. It has dedicated at least S\$3.5 billion on ICT spending to fuel the adoption of digital technologies (Yu, 2020). The gaps highlighted by Covid-19 suggest that for the sizeable government investments in digitalization to reap benefits, more of the resources should be channelled full digital inclusion and levelling up those who are most behind.

We have therefore proposed universal digital access as the *modus operandi* where digital resources are provided on a largely one-laptop-to-one-person basis automatically and affordably. Otherwise, groups that are already lagging will be left further behind.

While Singapore's digital inclusion efforts thus far are laudable, the tremendous mobilization in response to Covid-19 shows to us that true digital inclusion takes more than making programmes available. It requires co-ordinated commitment from multiple ministries and efforts from the ground up. Beyond technical knowledge of ICT, it also demands intimate social knowledge about digitally excluded communities, and business knowledge to involve businesses in corporate digital responsibility. Thus, IMDA needs to be supported by multiple ministries who should be tasked to work closely with IMDA to provide the social and business knowledge to implement programmes that can truly reach their intended goals and users. These include MSF, MOE and MND for low-income students and working poor households, and MTI and MOM for foreign workers and businesses.

A universal approach will cost more than targeted approaches because of wider coverage. And the efforts are not one-off. The progressive and redistributive efforts need to be kept up so that any initial push (propelled by Covid-19) can be productively built upon. Gaps in device, internet and knowledge will continually need to be plugged.

A more sustainable funding model for our national digital inclusion efforts could be one that includes a public-private funding mix. Huang and Cox (2016) documented and analysed Taiwan's model of funding and providing digital resources to low-income and homeless persons. They suggested "a social entrepreneurial system", where telecommunications companies are required to pay towards the Telecommunications Universal Services (TUS) Fund by market share. We could adapt from this model, and expand it to apply to big technology companies. In this digital age, the Big Tech companies have been able to leverage vast troves of user data for profit generation. Beyond imposing general taxes on them, requiring them to contribute directly to full digital inclusion is fair. It is time to rebalance access, because digital access is a need for everyday life and a source of social mobility.

References

- Ang, H. M. (2020, April 20). *About 12,500 laptops and tablets loaned out to students for home-based learning: MOE*. Channel News Asia. <https://www.channelnewsasia.com/news/singapore/covid19-laptops-schools-moe-education-home-based-learning-12658828>
- Goggin, G. & Zhuang, V.K.S. (forthcoming). Disability as Smart Equality: Inclusive Technology in a Digitally Advanced Nation. In P. Tsatsou (Ed.) *Digital Inclusion: Enhancing Vulnerable People's Social Inclusion and Welfare?* London: Palgrave.
- GovTech. (2020). *Digital services standards*. GovTech. <https://www.tech.gov.sg/files/digital-transformation/DSS%20for%20Public%202020.pdf>.
- Huang, S., & Cox, J. L. (2016). Establishing a social entrepreneurial system to bridge the digital divide for the poor: a case study for Taiwan. *Universal Access in the Information Society*, 15, 219-236. <https://doi.org/10.1007/s10209-014-0379-7>
- Infocomm Media Development Authority (IMDA). (2018, May 28). *Fact Sheet: Silver Infocomm Initiative*. https://www.imda.gov.sg/-/media/imda/files/about/media-releases/2018/fact-sheet--silver-infocomm-initiative_28-may-2018.pdf
- Infocomm Media Development Authority (IMDA). (2019). *Annual survey on infocomm usage in households and by individuals for 2019*. https://www.imda.gov.sg/-/media/Imda/Files/Infocomm-Media-Landscape/Research-and-Statistics/Survey-Report/2019-HH-Public-Report_09032020.pdf
- Infocomm and Media Development Authority (IMDA). (2020a, April 8). *Annex A: Factsheet on digital access programmes*. <https://www.imda.gov.sg/-/media/Imda/Files/Programme/NEU-PC-Plus/Annex-A-Factsheet-Digital-Access-Programmes.pdf>
- Infocomm and Media Development Authority (IMDA). (2020b, May 31). *New SG Digital Office established to drive digitalisation movement — 1,000 digital ambassadors to be recruited by June 2020*. <https://www.imda.gov.sg/news-and-events/Media-Room/Media-Releases/2020/New-SG-Digital-Office-Established-to-Drive-Digitalisation-Movement>
- Infocomm and Media Development Authority (IMDA). (2020c, November 6). *Seniors go digital*. <https://www.imda.gov.sg/for-community/Seniors-Go-Digital>
- Infocomm and Media Development Authority (IMDA). (2020d, November 6). *Hawkers go digital*. <https://www.imda.gov.sg/programme-listing/smes-go-digital/Hawkers-Go-Digital>
- Infocomm and Media Development Authority (IMDA). (n.d.). *Seniors Go Digital*. <https://www.imda.gov.sg/en/seniorsgodigital>
- Lim, M. Z. (2020, May 27). Coronavirus: Migrant workers important to S'pore economy, say business and trade groups in response to calls to limit numbers. *The Straits Times*. <https://www.straitstimes.com/singapore/business-and-trade-groups-underline-importance-of-migrant-workers-to-singapore-economy>
- Lim, S. S., & Loh, R. S. M. (2020). Young people, smartphones, and invisible illiteracies: Closing the potentiality-actuality chasm in mobile media. In E. Polson, L. S. Clark & R. Gajjala (Eds.), *The*

Routledge Companion to Media and Class (pp. 132-141). New York: Routledge
<https://doi.org/10.4324/9781351027342>

Ministry of Communications and Information (MCI). (2018). *Digital readiness blueprint*. Singapore Ministry of Communications and Information.

Ministry of Education (MOE). (2020). *Strengthening digital literacy*.
<https://www.moe.gov.sg/microsites/cos2020/refreshing-our-curriculum/strengthen-digital-literacy.html>

Ng, I. Y. H., & Lim, S. S. (2020, May 26). *Commentary: the case for universal digital access, as home-based computing becomes a post-pandemic norm*. Channel News Asia.
<https://www.channelnewsasia.com/news/commentary/universal-free-internet-access-remote-working-online-learning-12766858>

Ng, I. Y. H., & Lim, S. S. (2020, July 8). *When a disease uncovers digital divides*. AsiaGlobal Online.
<https://www.asiaglobalonline.hku.hk/when-disease-uncovers-digital-divides>

Oldenburg, R. (1989). *The great good place: Cafes, coffee shops, community centers, beauty parlors, general stores, bars, hangouts, and how they get you through the day*. New York: Paragon House

Tallvid, M., Lundin, J., Svensson, L., & Lindström, B. (2015). Exploring the Relationship between Sanctioned and Unsanctioned Laptop Use in a 1:1 Classroom. *Journal of Educational Technology & Society*, 18(1), 237-249. <http://www.jstor.org/stable/jeductechsoci.18.1.237>

TPG. (n.d.). *Seniors plans*. <https://www.tpgmobile.sg/seniors>

Yu, E. (2020, June 9). *Singapore government ups ICT spending by 30% to fuel post-pandemic recovery, digital transformation*. ZDNet. <https://www.zdnet.com/article/singapore-government-ups-ict-spending-by-30-to-fuel-post-pandemic-recovery-digital-transformation/>

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Annex A – Current Government Digital Access Support Schemes

This is a non-exhaustive summary of existing government digital support schemes, accurate as of 30 December 2020.

Digital Readiness Blueprint

The Digital Readiness Blueprint sets out recommendations for building Digital Readiness in Singaporeans, guided by four strategic thrusts:

Expand and enhance digital access for inclusivity

Infuse digital literacy into national consciousness

Empower community and businesses to drive widespread adoption of technology

Promote digital inclusion by design

<https://www.mci.gov.sg/en/portfolios/digital-readiness/digital-readiness-blueprint>

Digital Service Standard

The Digital Service Standard (revised in July 2020) lays out a set of standards that all public-facing digital services of the government must meet.

<https://www.mci.gov.sg/en/portfolios/digital-readiness/digital-readiness-blueprint>

NEU PC PLUS & Home Access Program

This is the fact sheet that provides all summarised information on NEU PC PLUS and the Home

Access Program ([IMDA, 2020a](#)): <https://www.imda.gov.sg/-/media/Imda/Files/Programme/NEU-PC-Plus/Annex-A-Factsheet-Digital-Access-Programmes.pdf>

Digital Ambassadors

Created by the newly formed SG Digital Office to accelerate the percentage of the digitally literate in Singapore ([IMDA, 2020b](#)), Digital Ambassadors are government agents that are tasked with providing 1-1 training to primarily elderly folk ([IMDA, 2020c](#)) and hawkers ([IMDA, 2020d](#)) with the necessary skills for using personal internet devices, or integrating contactless payment technology into their stalls respectively. Each Digital Ambassador is paid between \$1,800 and \$3,450, and will be attached to companies, community groups and the public to engage these target groups. For instance, digital ambassadors have been deployed to 112 hawker centres since June 2020 to increase uptake of MYSGQR for contactless transactions. 1,000 of them have been employed in response to the Covid-19 situation and the rising need for contactless communication since the end of June 2020. The goal is to educate 100,000 seniors with the ability to use mobile phones by March 2021, up from the original goal of an annual increase of 10,000.

Silver Infocomm Initiative

The Silver Infocomm Initiative (SII) focuses on boosting digital inclusion for seniors aged 50 and above. It promotes IT awareness and literacy among seniors for greater integration into the digital age. It was launched in 2007 and includes a range of activities and platforms for seniors to learn digital skills ([IMDA, 2018](#)). These activities include the Silver IT Fest Plus, Silver Infocomm Junctions

(SIJs), Intergenerational IT Bootcamps, Silver Infocomm Wellness Ambassadors (SIWAs), Friends of Silver Infocomm (FSI) and E-Payment Learning Journeys. The IM Silver Portal (<http://www.imsilver.imda.gov/>) also has online guides and resources covering a range of topics regarding usage of digital technologies.

The Silver IT Fest Plus is a series of annual events organised by IMDA, where seniors learn and build confidence in using technology. IMDA partners tertiary institutions, corporate and community organisations to offer workshops, exhibitions, learning journeys and seminars for seniors. The SIJs are learning hubs operated by various social service agencies, grassroots organisations or non-profit organisations. They provide affordable and accessible training that is conducted in multiple languages according to the senior's choice. The training is based on the Silver Infocomm Curriculum which integrates information on security, privacy and discerning fake news. The Intergenerational IT Bootcamps are conducted in partnership with various schools from primary to tertiary levels. They aim to improve digital skills to seniors through interacting with the younger generation. SIWAs are seniors who have active IT lifestyles while actively encouraging their peers to use digital platforms as well. They are selected through nomination and appointed by IMDA and the People's Association Active Ageing Council (PAAAC). FSI promotes volunteerism and aims to help seniors keep up with trainers during IT workshops and classes. Volunteers are welcome on an individual or corporate basis and should be familiar with digital devices and enjoy working with seniors. The E-Payment Learning Journeys are experiential tours for seniors to learn various modes of e-payments. Seniors are accompanied by volunteers who guide them in various e-payment platforms such as internet banking, MRT card top-ups and QR code payments.

Seniors Go Digital

Seniors Go Digital is an online platform with resources for seniors to learn new digital skills ([IMDA, n.d.](#)). It is part of the SG Digital Office to support greater digital adoption in the community for our recovery post-COVID-19. Seniors Go Digital provides a tailored program of 3 tiers, according to needs and skill levels. Tier 1 includes learning basic communication tools through messaging and video calls, Tier 2 covers digital government services like SingPass and SafeEntry and Tier 3 includes learning e-payments and digital banking through SGQR code payments, internet banking and cybersecurity tips. Seniors can learn in various ways, at SG Digital community hubs, through learning journeys or online learning. They can choose to be guided by facilitators or instructors, or access self-learning tools and guides. Guided learning activities include in-person or virtual digital clinics where seniors get 1-to-1 guidance, or participate in group activities such as experiential learning journeys, classroom-based learning programs or online classes. The Seniors Go Digital platform also provides information regarding senior-exclusive mobile plans from selected telcos. One example of this is a seniors-only mobile plan offered by TPG at only \$5 monthly, inclusive of 20GB of data, 30 minutes of call time and 30 local SMS ([TPG, n.d.](#)).

National Digital Literacy Framework

The digital literacy framework is a guideline created by MOE that underpins pedagogical digitisation efforts in Singaporean schools. The framework espouses 4 key values, which are 1) Find: to train students to look for information on the internet in a safe manner, 2) Think: teach students how to

analyse data gotten off the internet to solve problems, 3) Apply: provide opportunities for students to use digital software to apply knowledge learnt in school and 4) Create: encourage the use of digital software to generate new digital products, and to encourage digital collaboration ([MOE, 2020](#)).

Because schools in Singapore are going to follow this vision statement with the progressive integration of personal learning devices into compulsory education, children from low income households will be able to learn basic digital literacy skills at least by 2024, such as learning how to look things up online to incorporate into reports, and collaborate online with their peers within the curriculum of compulsory education ([MOE, 2020](#)).

MOE will also provide greater support to schools in meeting the aims of the digital literacy framework. This includes increased funding for enhancing school digital infrastructure and investment in in-school IT support centres, to be progressively rolled out from 2021, with the aim to complete in 2028. These IT support centres will be able to assist low-income children with no access to IT help at home.

Annex B – Report prepared with support from:

Anita Low-Lim, TOUCH Community Services

Amran Jamil, Elisha Paul Teo Chien Woon, Fatima Zahida, Louisa Bielig, Udhia Kumar, Family Social Work Chapter, Singapore Association of Social Workers

Grace Chee, Singapore University of Social Sciences and Family Social Work Chapter, Singapore Association of Social Workers

Hannah Huang Xuan, SHINE Children and Youth Services

Hui Naixiang

Internet Society (Singapore Chapter) - Sofia Morales, Project Leader for Digital Inclusivity and Digital Divide

Johann Annuar, Engineering Good

Kathy Teo, Bridge the Digital Divide

Nicholas Chan, Jewel Yi, Lim Chu Hwai, Covid Migrant Support Coalition (CMSC)

Oh Qing Xiang

Ranganayaki Thangavelu, Beyond Social Services

Ruth Tan, South-Central Community Family Service Centre and Family Social Work Chapter, Singapore Association of Social Workers

Teo Tee Loon, Lakeside Family Services and Family Social Work Chapter, Singapore Association of Social Workers

Victor Zhuang