FUSION

THE POTENTIAL OF TECHNOLOGY AND DESIGN

SUTD

SINGAPORE UNIVERSITY OF TECHNOLOGY AND DESIGN

ISSUE 19 / 2021

SUTD MINISTERIAL FORUM 2021
WITH DPM HENG

DOES OUR EDUCATION SYSTEM PREVENT YOUTHS FROM ACHIEVING THEIR GOALS?

DPM Heng and student moderator Ng Jing Da at the dialogue session

BY LEE JIA JUEN

During the SUTD Ministerial Forum 2021, Deputy Prime Minister Heng Swee Keat shared on many topics such as education, environmental sustainability and the impact of Covid-19. What stood out to me was when DPM Heng pointed out that the original 5Cs of Singapore, namely Cash, Car, Credit Card, Condominium and Country Club were a thing of the past as they no longer resonate with the youth of today. In his speech, he proposed three new Cs that are the need to "Create, Care and Chart the way forward" as he finds that these are what drive today's youth.

He went on to describe that it is unfair to label the younger generation as the "strawberry generation". Addressing youths, he said "many of you are dynamic and enterprising, pursuing your passion, starting your own ventures and not afraid to try new things". The younger generation simply have different aspiration as they have grown up in a different phase of Singapore's development and have been exposed to much more. These 3Cs are what DPM Heng believes better captures the goals and aspirations of my generation and I personally would agree with him.

To probe further on this topic, I asked DPM Heng if our current education system would inhibit youths in achieving these 3Cs given as it is often perceived to be routine based and repetitive.

In response, DPM Heng shared that there are merits in rote learning that we must not overlook and reminded that grades are not everything. He added that efforts are always being made to continually upgrade our education system.

For example, studies of universities in the United States, investigations on what tuition centres might be doing better than schools and exploration of flipped classroom techniques have been done. He further cited that prior to the recent change in the PSLE grading system, considerations were even made to abolish it completely.

DPM Heng then concluded by sharing that SUTD is a pioneer in new methods of education that are proving to be effective. While other academic institutions slowly begin to follow, SUTD is ahead of the curve and continues to adapt to the rapidly changing landscape. DPM Heng put forth some very compelling points and definitely gave us assurance in what the country and university are doing to advance education to better cater to the needs of future generations.

CHENG HONG SIANG TNG DONATES $1M FOR SUTD'S NEEDY STUDENTS

The Cheng Hong Siang Tng donated S$1 million to establish the Cheng Hong Siang Tng - SUTD Education Opportunity Grant (SEOG). This bond-free grant will provide financial support to financially disadvantaged undergraduates every year, with each student receiving S$7,500 a year for their tuition fees and study-related expenses.

From left: Cheng Hong Siang Tng Vice Chairman, Mr Ang Chin Koon, Cheng Hong Siang Tng Chairman, Mr Tang Weng Kui, South East District Mayor, Mr Mohd Fahmi Bin Aliman and SUTD President, Prof Chong Tow Chong

This is Cheng Hong Siang Tng's second and largest donation to the university directed towards the establishment of student awards. In 2018, they established the Cheng Hong Siang Tng - SUTD Bursary, which has since benefitted 15 students.

Chairman of Cheng Hong Siang Tng, Mr Tang Weng Kui said, "There is a saying that education is the foundation that paves the way for the future. As technology rapidly advances, the future generations can stay relevant only through education. Cheng Hong Siang Tng's mandate has always been to lend a helping hand to the needy – through this donation to SUTD, we hope that youths from less well-to-do families can also afford higher education in the STEM fields and define their own futures."

SUTD President, Professor Chong Tow Chong said: "At SUTD, we are committed to ensure that no deserving student will miss out on our unique design-centric education because of their financial circumstances. With several financial aid schemes, including the SEOG, we believe that these students can wholeheartedly access our programmes to better the world, free from monetary concerns. We are especially grateful to Cheng Hong Siang Tng for helping to make this a reality with their generous donation."

Mr Mohd Fahmi Aliman, Mayor of the South East District, was the Guest-of-Honour at the donation ceremony which took place at SUTD on 12 March 2021.

STRONG DEMAND FOR SUTD'S CLASS OF 2020 DESPITE UNCERTAIN ECONOMY

The sixth batch of SUTD graduates continue to see strong employer demand with close to 96% of the Class of 2020 obtaining jobs within six months of completing their final exams despite the uncertain economic situation due to the pandemic. 80.9% of SUTD graduates in the labour force secured full-time permanent employment. These results were reported in the latest Graduate Employment survey, which saw participation from 302 out of 372 fresh graduates.

Salaries commanded remain competitive with median gross monthly salary for these fresh graduates employed in full-time permanent employment at $4,100 in 2020, compared to $4,072 in 2019. The mean gross monthly salary among SUTD's fresh graduates employed in full-time permanent employment increased to $4,369 in 2020, compared to $4,235 in 2019. The top hiring industries include Information & Communication, Financial & Insurance and Scientific Research & Development.

Here are some of what our students have done after graduating.

Adarsh Jayant Kamdar
Bachelor of Engineering in Engineering Systems & Design, SUTD-SMU Dual Degree Programme

Adarsh is currently an Associate at Boston Consulting Group where he works with clients to help them identify their highest value opportunities and help with their challenges. Adarsh's interest in consultancy was sparked whilst studying design and entrepreneurship modules at SUTD. He found himself more interested in topics focused on strategic aspects covered in these modules, such as whether a product fits the market and the go-to market strategy for a product launch, beyond just engineering the product. This was the main draw for him to transition from engineering into the consultancy industry.

Graduating during the pandemic was challenging and uncertain. During his job search, Adarsh encountered stiff competition and limited full-time opportunities. Nevertheless, he persevered and continued to look at the situation positively, viewing his career journey to be a marathon, rather than a sprint. This positive mindset eventually landed him the role he wanted.

As he was new to this sector, Adarsh experienced a steep learning curve. However, he took it as a challenge as there was always something new to learn. He feels that the real-world knowledge and skills gained at SUTD have helped him ease into his current role. Design, Entrepreneurship and the Capstone modules were especially beneficial, as they equipped him with a variety of skillsets required at work, such as project management, strategic market analysis, stakeholder management and design thinking to name a few. Working with peers from different specialisations and pillars in school also taught him how best to leverage on everyone's skills in a team to produce the best outcome.

Soh Su Min
Bachelor of Engineering in Engineering Product Development

Su Min is currently working as a Biomedical Engineer Trainee at start-up Crely Healthcare, where she is involved in the testing and development of a medical device for the early detection of surgical site infections. She also leads and participates in clinical studies for the device.

Su Min chose to explore opportunities under the SGUnited Traineeship (SGUT) Programme to boost her employment prospects, as it offered a range of positions across different sectors. She credits the SGUT for helping her make the leap into the healthcare industry even with her limited prior experience.

She joined Crely Healthcare as she believed that the device would be able to meet a real clinical need. She also enjoys working in a start-up environment, which provides her with opportunities to learn and develop in multiple ways, especially with a relatively small team. Her current role is aligned with her interest in the healthcare industry, as she had specifically chosen to major in Engineering Product Development to select the healthcare engineering track under this pillar.

The core skillsets that Su Min had developed in her time as an Engineering student in SUTD enabled her to quickly adapt and manage her current work portfolio. For instance, she had honed applied engineering and design skills such as Computer Aided Design and basic coding skills. These played an integral part in the technical aspects of her work, in developing and testing the medical device. Project work and industry attachments embedded in SUTD's curriculum, as well as her internship stint enabled her to develop soft skills such as communicating with stakeholders and project management which have proven essential to her current job.

In future, Su Min hopes to further develop herself as a project manager, and continue to work within the healthcare and biomedical ecosystem, to help meet current and future clinical needs.

SUTD AND J.P. MORGAN PARTNER TO PROMOTE STEM EDUCATION TO SECONDARY SCHOOLS THROUGH THE SCHOOLS CHALLENGE

To broaden youths' interest in STEM and Design Innovation, SUTD partnered J.P. Morgan to organise the Schools Challenge (Singapore) programme. This initiative was also supported by the Urban Redevelopment Authority (URA), which provided the Challenge's theme "Smart Ways To Live Happy: Going Car-Lite and Enliven Public Spaces".

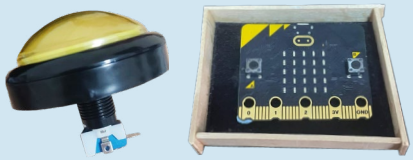
This eight-week online training and mentorship programme was rolled out to 10 local secondary schools and garnered over 80 lower Secondary school students' participation.

The students were mentored by SUTD students and J.P. Morgan professionals on design innovation, STEM principles, app development and business pitching. Each school was also sent a 3D printer, microbits and prototyping materials as added resources for students to build and make, applying their STEM skillsets acquired through the programme.

The student projects were focused on social innovation, addressing needs of the elderly, people with disabilities, emotional wellbeing of younger people and public transportation for the masses. These projects will later be showcased at the URA Centre, while suitable projects will be considered eligible for the Housing Development Board's 'Lively Places Fund'.

The Schools Challenge culminated in a closing virtual showcase on 23 April, where all 21 student teams pitched their ideas and showed their prototypes to a panel of judges from J.P. Morgan, URA and SUTD.

Here is the list of the winning teams and their projects.



NGEE ANN SECONDARY TEAM 1: OVERALL WINNER

The team designed a customisable and interactive light installation to encourage more people to visit parks. The team built a physical 3D model of interactive light paths that lights up with applied pressure.

Judges' Comments: Very attractive idea based on the fact that Singapore is a city of lights. The light paths can help create ambience especially so since parks are most frequented during hours such as dusk and dawn. Also, a lot of potential for the lights to be strategically placed not just at ground level but also on buildings. This way, it becomes a simple, humble concept with a lot of potential to create a beautiful effect for the rest of the city and not just the people in the park.

The team prototyped a VR pet that allows users to learn about flora and fauna in parks while playing with their virtual pets. It also enables social interaction through playing with other users' pets and earning incentives like drinks at the vending machine.

Judges' comments: The prototype could be likened to a virtual assistant, one that could also communicate and pre-empt the crowd at the park. Judges also drew reference to "Tamagotchi", the digital handheld pet that was one of the biggest toy fads of the late 1990s. They encouraged the students to borrow from the best of these previous successes and improve where they can.

TECK WHYE SECONDARY TEAM 1: BEST PITCH

The team designed a lively rooftop garden for the neighbourhood communities to gather. The team did extensive research into the problem of a lack of space for communities to gather. They converted wasted space above public carparks to conducive environments made for residents and their needs.

The team showcased a virtual 3D model of the rooftop, with flythrough animations. They tested it out with 75 residents from the Choa Chu Kang/ Teck Whye area by showing them a video tour of their rooftop garden and conducting in depth surveys and interviews, and 100% responded positively.

NANYANG GIRLS TEAM 1: PEOPLE'S AWARD

The team's solution, Project D.Home, is an inclusive playground for children with disabilities. The team surveyed 400 people, including occupational therapists, people with disabilities, and designed a safety dome structure, inclusive communal seating space, wheelchair swings, drawing cave and claw machines. They received a more than 90% positive feedback. Besides building a physical 3D model, the team also developed a digital 3D model and website.

Judges' comments: Judges were impressed with how these young students were so socially aware of our community spaces that could do with so much more improvement in terms of being inclusive. This idea of an inclusive playground was a heartwarming one but Judges were quick to highlight that it is important that all the safety features of the playground be thought of carefully. Also, instead of housing the inclusive playground in one place, the team could think of modular concepts where modular aspects of the playground can be placed in common areas to integrate seamlessly into community spaces to make these more accessible for all.

Judges' comments: Great concept and well delivered presentation. Judges shared that much thought and research must go into the choice of suitable materials e.g. solar panels, head conducting materials especially so since the rooftop will be very hot.

SUTD AND CGH CO-CREATE BWATCH FOR EARLY DETECTION OF WOUND BLEEDING

SUTD and Changi General Hospital (CGH) have developed the **Blood WArning Technology with Continuous Haemoglobin (BWATCH) sensor,** a lightweight monitoring device placed over a patient's bandage that detects real-time bleeding from wound sites following invasive medical procedures.

BWATCH was developed with haemodialysis patients in mind, as there is a risk of bleeding occurring after a catheter is inserted during vascular access procedures. These patients suffer from acute illnesses, which can lead to a sudden deterioration of their kidney functions and will require haemodialysis to filter out waste products from the blood. The wound sites for these patients are usually heavily bandaged and covered under blankets as they rest. To ensure that patients are recovering well, the care team conducts regular inspections, as many as four times in an hour, to check for any bleeding.

Designed to complement patient care and enhance patient safety, BWATCH's ability to detect bleeding early will reduce the risk of a potential major bleeding episode. The device is also useful in the care of patients who are incapacitated and unable to call for assistance. As more confidence is gained from wider use of this device, the frequency of inspections and resource requirements may be reduced with no compromise to safety.

From left: CGH Associate Prof Chionh Chang Yin and SUTD Associate Prof Foong Shaohui, holding the BWATCH medical device.

"Heavy bleeding following medical procedures is rare but when it occurs, it can be life-threatening. Monitoring at short intervals is highly manpower intensive but necessary. However, despite close monitoring, bleeding may still occur between these inspections. BWATCH offers continuous monitoring, allowing the care team to focus on other patient-centric tasks," said Associate Professor Chionh Chang Yin, Chief and Senior Consultant, Department of Renal Medicine at CGH.

"While there are other commercial systems and products that are available for fluid detection, they are only able to detect the presence of fluids by changes in physical properties such as electrical resistance, capacitance or opacity to light. None of the detection methods were specific for blood, making BWATCH a precise non-invasive sterile monitoring device for early detection of bleeding," said Associate Professor Foong Shaohui, Engineering Product Development, SUTD.

Besides haemodialysis patients, BWATCH is applicable to other patient types within the hospital. It can be used on other wound types or locations that are prone to external bleeding, for example in post-cardiac catheterisation. The device can also be tested in other clinical situations beyond the hospital setting, such as on-site monitoring of traumatic wounds. The shape of the device would have to be adapted for different wound types.

CGH and SUTD have patented BWATCH in Singapore and the United States (US), with future plans of commercialisation with suitable industry partners. BWATCH is the first joint patent between CGH and SUTD under a partnership to develop innovative patient care solutions to address evolving healthcare challenges.

ITRUST PARTICIPATES IN NATO'S EXERCISE LOCKED SHIELDS

The organiser briefing members on the SWaT digital twin used by the Blue Teams

Exercise Locked Shields: 22 Blue Teams defending against over 4,000 cyber attacks in what is dubbed the largest and most complex international live-fire cyber defence exercise in the world. The annual cyber exercise is organised by the NATO Cooperative Cyber Defence Centre of Excellence (CCDCOE) and stretched over two intense days where the blue teams, comprising NATO member nations and partners of CCDCOE, practised the defence of national IT systems and critical infrastructure (CI) in the event of a large-scale cyberattack.

As a Centre for Research in Cyber Security at SUTD specialising in the safety and security of CI, iTrust contributed to one of the CI platforms used in the exercise. A digital copy of iTrust's Secure Water Treatment (SWaT) testbed – the SWaT digital twin – was replicated across 22 systems so that every Blue Team could defend it against the Red Teams' attacks. Not only was this the first time iTrust could actively contribute to Exercise Locked Shields, it was also the first time the SWaT digital twin was used on such an international scale.

TRANSFORMING ONLINE LEARNING EXPERIENCES IN DESIGN: COLLABORATION BY DESIGN EDUCATORS FROM SUTD AND CU DENVER

The COVID-19 pandemic led to myriad changes in travel, business conduct and human interaction. It also led to innovations in how learning exchanges can be created between nations and cultures.

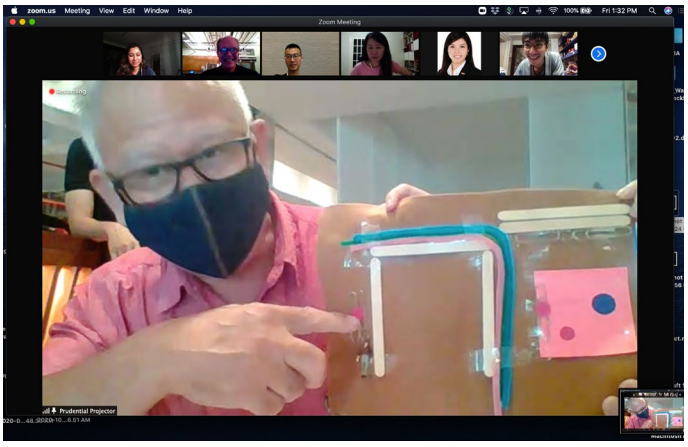
A team of multi-disciplinary educators from Singapore and the United States banded together to co-create and develop an innovative, online cultural exchange, with the goal of transforming learning experiences in Design Innovation (DI). The team included members from the SUTD-MIT International Design Centre (IDC) and University of Colorado (CU) Denver, Colleges of Engineering, Design and Computing and Arts and Media, along with the Comcast Media and Technology Center. Workshops developed by the team focused on bringing the skill sets, mindsets and principles of design thinking across disciplines, industry sectors and public organisations, into an innovative online environment.

This cross-cultural DI project, which was supported by a grant from US Embassy Singapore, began in September 2020 and was comprehensively delivered over three phases.

Zoom 1 – Screenshot of the Zoom call

Phase One saw the team embarking on the co-creation of distinctive state-of-the-art online DI workshops using such tools as Zoom, Miro virtual whiteboards, video modules, prototyping kits mailed to participants and template-structured hands-on interactive activities.

In Phase Two, the educators iterated on workshop content and execution with 10 business and public service leaders in Singapore and the US, and pilot 100-participant workshop sessions over multiple days.

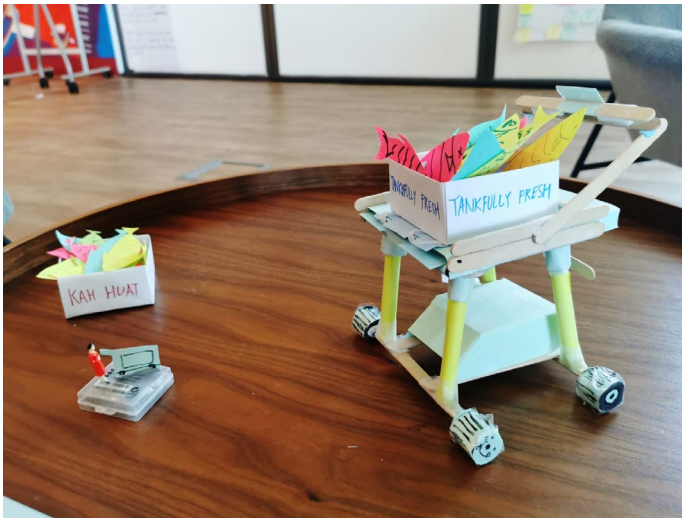


Screenshot – Participant holding up and presenting the prototype

Miro Board – Online Collaborative whiteboard where all parties exchanged ideas

Wrapping up in Phase Three, the US-Singapore collaborative DI workshops were progressively rolled out to several prominent industry and public partners, including a highly impactful small-medium enterprise (SME) accelerator initiative.

One notable outcome from this collaboration between SUTD and CU Denver was a deep and meaningful cultural exchange between the participants in a challenging virtual environment and this positive result was replicated for the SMEs. The collaborative project led to an innovative design process that crossed cultures and disciplines to produce tools that will benefit participants across organisations.



SG Fisheries – Sample of a Low fidelity prototype created during the workshop

Through this transformative US-Singapore collaboration, hundreds of participants were trained in DI, while bringing innovation, entrepreneurship and intrapreneurship to a variety of organisations. Dozens of DI projects were implemented in partner organisations, inspiring their businesses and offerings. These projects included implementation with SMEs as they faced the need to re-invent themselves and their business markets during the pandemic. Examples would include partnerships with public organisations in the innovation of Smart Hawker and Food Courts with local merchant associations on reinventing their business to overcome challenges like ageing workforce and technological disruptions within their industry. New opportunities in innovation were also brought to all organisations as their employees worked in remote settings.

Professor Kristin Wood, SUTD's Director of Design Innovation and Principal Investigator for this programme said: "This cross-cultural project reconceptualised how one delivers design in an equitable way to professionals and students. DI, in this sense, becomes a human-centered, interdisciplinary approach to innovate and address complex challenges in the world. Individuals with domain knowledge in various fields, including engineering, architecture, science, psychology, and business, came together as a team to understand the underlying issues, and through a facilitated process, solved these in an innovative manner. Such collaborations improve lives and community."

Mr Cain Harrelson, Deputy Public Affairs Officer, US Embassy Singapore, said: "The cross-cultural DI project between SUTD and CU Denver is testament to the importance of cultural exchanges and international collaborations. The success of this bilateral cooperation is especially exciting as we mark 55 years of diplomatic relations between the United States and Singapore, celebrating our shared history of advancing creativity and innovation."

ASD YOUTH-TOPIA STUDIO CONTRIBUTES IDEAS TO THE SOMERSET BELT MASTERPLAN

In May 2020, the Ministry of Culture, Community and Youth (MCCY) and the National Youth Council (NYC) unveiled the Somerset Belt Masterplan. This was the product of more than 9,300 youths who worked with MCCY and NYC across three phases of a broad-based engagement and co-creation process to develop their vision for the Somerset Belt. The precinct would be a space designed by youth, for the youth.

Aligning with the objectives of SUTD's Architecture and Sustainable Design (ASD) option studio Youth-Topia to exercise their creativity while engaging with real world issues, the University approached MCCY with a proposal to create a unique civic space for youths at the Singapore Somerset Youth Park as part of Somerset Belt revitalisation. Here are the projects that were installed at the Park from 26 March to 7 May. They can now be viewed at Building 2 on SUTD campus.

Stomping Ground (by Grace Sim & Lester Lim)

STOMPING GROUND is a project with a vision of "creating streets for the youths, instead of keeping them off". Through discovering the site's historical significance, the project revives the cultural essence of street art and other subcultures to create an urban environment that will become a popular haunt for youths.

Somerset Living Room (by Simon-Kyle Rocknathan & Tay Boon Kiat)

As a means of supplementing the plethora of programmes surrounding the site, the Somerset Living Room project fills the gaping lack of public seating space in the area by creating a multitude of urban living rooms. Youth are invited to find a space of their own amongst a range of privacy levels and intermingle with their 'neighbours' with the cut-outs designed to promote intermingling through a variety of activities.

The concept of the urban living room was derived from a collection of 40 living room images, which were deconstructed to explore the elements comprising a living room and the interactions that take place in the space. Pitch-roofed modules with movable walls and plug-in furniture were designed to propagate the site and form unique, endlessly re-configurable 'rooms' to accommodate its users. Module placement was regulated by site shading studies and a proposed circulation route, which utilises a scramble crossing to create a more direct route for pedestrians to the site.

SINGAPORE UNIVERSITY OF
TECHNOLOGY AND DESIGN

FUSION - THE POTENTIAL OF TECHNOLOGY AND DESIGN

Office of Marketing & Communications, SUTD
8 Somapah Road, #06-301
Building 3 Level 6, Singapore 487372
T: +65 6303 6600
W: www.sutd.edu.sg/newsletter

SUTDsingapore

SUTDsg