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Sustainability Education

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Contents

Education for Sustainable Development

Education for sustainable development is multifaceted and complex, encompassing economic, political, social, cultural and environmental dimensions. It requires us to think very carefully about the type of education system that can nurture individuals with the necessary skills and attributes to face the environmental and social challenges facing Singapore and the wider world in the years to come. The Singapore Green Plan outlines a whole-of-nation approach towards advancing Singapore's sustainable development goals, wherein the role of schools and educators has been outlined in the Ministry of Education's Eco Stewardship Programme (ESP). This edition of *SingTeach* highlights the initiatives that schools like Commonwealth Secondary School, Tampines Secondary School and Mee Toh Primary School have taken to integrate ESP's 4Cs (curriculum, campus, culture and community) to support sustainability education. The educators interviewed here recognize the importance of both interdisciplinary learning as well as the development of values in sustainability education—seeking a whole-of-school approach that blurs the boundaries between the academic curriculum and co-curricular programmes.

This move towards redesigning how sustainability education is experienced in our schools should be supported by research. To this end, the Sustainability Learning Lab (SLL) at NIE has a mandate to lead in sustainability and sustainability education research, searching for evidence-based understandings of the types of curriculum and pedagogies that support learning for sustainable societies. This issue features the work of two education researchers and members of SLL. Associate Professor Tan Aik Ling's research demonstrates how an interdisciplinary team of collaborators has sought to understand the impact of immersive learning experiences on students' motivation to learn and care about the environment, while Dr Johannah Soo has studied food sustainability from the consumer point of view. Both types of research have value in informing how sustainability education can be strengthened in the Singapore education system, with concrete recommendations for curriculum and pedagogy in schools. By extension, such research also implies that there is scope for re-thinking the ways in which we prepare new teachers and develop professional development courses for in-service teachers.

There is much work to be done, particularly in trying to move sustainability education beyond a narrow conception of learning about the natural and urban environment towards developing a sense of individual and collective responsibility towards the environment, ecosystems and societies. The examples in this issue showcase positive steps in the journey towards this goal.

Dr Tricia Seow
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Online Exclusive

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Game Your Way to a Greener Tomorrow: Sustainability Education

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The list of research projects on the ER Connect page will be refreshed periodically. We encourage you to share about ER Connect with your fellow colleagues in your school. We hope that providing such information will serve to reduce the research-practice gap and inspire you to embark on an education research journey alongside NIE experts.

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Building a Sustainable Future Through Education

Singapore is not immune to the effects of climate change such as rising temperatures, sea-level rise and more extreme weather events. While the science of climate change is still evolving, it is important that we take urgent and necessary steps to mitigate and adapt to these challenges. Education plays a critical role, not only in raising awareness and knowledge on environmental and sustainability issues, but also in encouraging students and communities to think of innovative solutions that can drive more sustainable ways of living. Guest editor of this *SingTeach* issue, Dr Tricia Seow, Senior Lecturer and Assistant Head of the Humanities & Social Studies Education Academic Group at NIE, shares more about sustainability education as well as its future direction in schools today.

SUSTAINABILITY IS A GLOBAL ISSUE

"Sustainability issues affect all of humanity, though the exact nature of the issues may differ due to the context of each place," Dr Tricia Seow, who is also the co-chair of the Sustainability Learning Lab at NIE, says.

Taking the example of climate change, she highlights how a small tropical island state like Singapore is affected directly and indirectly by climate-related risks.

"Warming global temperatures will see Singapore experiencing changes in weather patterns with more intense rainfall. Rising sea levels due to melting ice caps and the thermal expansion of sea water will also mean potential loss of low lying land as well as floods," she says.

Events that occur in one part of the world will have a ripple effect felt and seen by other parts of the world too, including Singapore. Singapore's reliance on food imports, for instance, will mean that the resilience of farming in places like the Mekong Delta is of importance.

"Threats to agricultural areas such as droughts and saltwater incursion caused by climate change and changes to river systems due to dams and riverbed mining, have an impact on farmers who might decide to stop farming and move to cities in search of alternative livelihoods—an act that will affect global and regional food supplies," she explains.

There is an urgency to understand what is happening to other people in countries across the globe, as well as the need to search for solutions to the problems they are facing.

"These solutions may mean the need to help others mitigate and adapt to climate change even though they are not in Singapore, as we live in a hyper-connected world," she adds.

THE EVOLUTION OF SUSTAINABILITY EDUCATION

Tricia shares that concern for preserving the physical environment (e.g., protecting forests and nature spaces, as well as preventing pollution of the natural environment) began as early as the late 1800s. However, in the 1970s and 1980s, **environmental education** gained traction, with the Belgrade Charter (UNESCO, 1975) recognizing that to conserve the physical environment, the social, cultural and political dimensions had to be addressed as well.

"Over time, the nomenclature changed to **sustainability education** as there was more recognition of the importance of integrating the complex inter-relationships among the physical environment and social, cultural and political aspects of societies into environmental education," she explains.

An international resolution adopted by the United Nations (UN), the "Decade of Education for Sustainable Development (2005-2014)", emphasized the need to integrate sustainable development issues like climate change, biodiversity and disaster risk reduction into all aspects of education and learning (UNESCO, 2005). In 2015, the UN adopted the Sustainable Development Goals (SDGs) which not only broadened the scope of sustainable development issues, but also continued the emphasis on sustainable development through education (UN, 2015).

"In short, there has been a progression from environmental to sustainability education over time, given the increasing attention to inter-relationships among the physical and social worlds. Some might even argue that environmental education is a subset of sustainability education," she remarks. "Most importantly, the scope of issues that can be addressed in sustainability education has also broadened such that it is relevant to most aspects of education/subjects."

INTEGRATING SUSTAINABILITY INTO EDUCATION

"Schools indubitably play an important role in developing the knowledge and skills that young people need to participate in sustainability issues and work towards those UN sustainable development goals," she affirms.

She notes how Geography was a natural fit during UNESCO's Decade of Education for Sustainable Development as it is a discipline that addresses issues like climate change, biodiversity and disaster risk reduction. However, with the breadth of sustainable development goals today, all subjects have the capacity to tackle and engage students on sustainability issues.

"Science subjects can engage students around the science of climate change, impacts of development and climate change on ecologies. Social Studies is a key subject that educates students about governance—surely sustainable development and climate issues involve governance and how we as individuals can engage with the state on these matters. Languages and Art subjects can focus on how we communicate about sustainability issues too," she explains.

She also emphasizes the importance of adopting a holistic and interdisciplinary approach to sustainability education and highlights how the Ministry of Education's Eco Stewardship Programme (ESP) is one of the important building blocks in this endeavour.

"The implementation of ESP in local educational institutes has seen schools and institutes of higher learning integrating sustainable development into their curriculum, campus infrastructure, institutional culture and practices, as well as partnerships with the community," she comments.

NAVIGATING THE FUTURE

Reflecting further on the future direction of sustainability education, Tricia acknowledges the good work done in schools in this area. However, she notes that it is also important for school leaders and teachers to think ahead and develop more innovative pedagogies in their approach to sustainability education.

"If we teach about these issues in a technocratic and factual way, then students will treat them just like any other topic they are required to learn for assessment," she states. "We should try to get students to understand how people in other parts of the world are already impacted by issues like climate change. For example, how do people without air-conditioning or stable water supplies cope with heatwaves and droughts, and who are the people who are losing their homes to rising sea levels?"

Not only that, she points out how it is also important that students are provided with positive examples of what people are doing to overcome these problems. These could be in the form of innovations, community initiatives and partnerships among individuals, business and government.

"Students should be nudged to realize that problems the world is facing are not necessarily insurmountable, and that they have the power to make informed decisions and take individual and collective action," she says with much conviction. "It would be best if students are empowered to apply these insights into felt and lived issues they themselves have witnessed and want to address."

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ABOUT THE GUEST EDITOR

Tricia Seow *is Senior Lecturer and Assistant Head of the Humanities & Social Studies Education (HSSE) Academic Group at NIE. She is also Programme Leader for HSSE's Professional Development programmes and co-chair of the Sustainability Learning Lab at NIE. Her research interests include sustainability and environmental education as well as geographical inquiry in both the classroom and in the field.*

Cultivating Students' Interest for the Environment

To cultivate the next generation of environmental stewards, it is important that we first gain a better understanding of how learners develop interest and knowledge towards the environment. How can an immersive informal learning experience help learners build that interest? Associate Professor Tan Aik Ling from NIE's Natural Sciences & Science Education Academic Group shares about her research project that looks at how schools can nurture every student to develop a lifelong commitment to eco-stewardship through immersive informal learning experiences, while also integrating concepts from the geography and science curriculum.

LEARNING ACTIVITIES AT ST JOHN'S ISLAND

Associate Professor Tan Aik Ling's research project, a 3-day non-residential programme involving three secondary schools, was carried out at St John's Island. The island, located at the southern coast of Singapore, is known for its vast biodiversity.

"St John's Island is an ideal place as its natural habitats are preserved. We wanted to find out if students do think that various eco-systems on the island, such as mangroves, coastal forests and coral reefs are worthy to be conserved," she says.

She explains how six activities were carried out every day, with each day divided into two blocks—one in the morning and another in the afternoon.

"In the morning, we will typically bring them outdoors to interact with nature and with one another. In the afternoon, we will usually be indoors in the St John's Island National Marine Laboratory, which is managed by the National University of Singapore (NUS) Tropical Marine Science Institute," she describes.

Some of the outdoor activities include going to the coastal front to learn about wave energies and exploring the mangrove swamp to study the organisms found there. Students also had the opportunity to learn about land reclamation and coral restoration at the marine laboratory.

"We created models of St John's Island and Kias Island and had students re-enact the process of land reclamation. Through this activity, they realized how land reclamation impacts marine ecosystems such as coral reefs. The scientists in the marine laboratory then walked them through the coral restoration process as well," she says.

ARE STUDENTS INTERESTED?

According to a study done by Hidi and Renninger (2006), interest can be conceptualized in four phases: triggered

situational interest, maintained situational interest, emerging (less-developed) individual interest, and well-developed individual interest.

"One of our intentions in conducting this programme is to trigger situational interest related to the environment and observe how long this interest can be maintained," she shares.

Triggered situational interest refers to a temporary form of interest that is elicited due to a specific situation or event. This first phase is important as it piques the learner's interest and motivates them to look up and understand the topic or content more thoroughly.

Findings from her research study indicate that the programme has been successful in triggering the interest of students on environmental issues. However, the interest falters soon after the programme ended.

"It is important to maintain the situational interest (the second phase) among learners. Certainly, there is a need for periodic stimulus after the programme has ended to sustain the participants' interest over time," she comments. "Perhaps future studies can be conducted to map out the ideal frequency of activities as well as the types of activities that could be run such as online exercises."

THREE KEY DESIGN PRINCIPLES

Findings from Aik Ling's research study have also shed light on the key design principles a successful environmental learning experience should have. She shares with us three main design principles.

Hands-on Experiences

"Having students engage directly with the environment is essential in piquing their interest," Aik Ling asserts.

She emphasizes the importance of giving students more opportunities to immerse themselves in learning experiences that allow them to use their sense of touch, sight and sound in outdoor spaces.

"One of the key insights from students was that when they are exposed to nature, they feel compelled to protect nature's biodiversity," she shares. "After attending the coral restoration workshop, for example, they felt uplifted that they can play a role in slowing down the rate of environmental degradation."

Meaningful Facilitation

She also advocates facilitating talks by specialists in the field that can open students' minds to new ideas. The on-site programme, for example, was facilitated by marine scientists and students were able to learn and ask questions about their various conservation efforts.

"Having experts who are able to address their questions in a logical and non-judgmental manner is important because this encourages them to be more curious," she comments.

Discovery and Exploration

"One of the activities curated for the students on the last day of the programme was a free exploration of the island to complete an envisioning exercise for the island's future. This was something that students enjoyed doing a lot," she shares.

Running creative sandboxing activities for the students, for instance, can be one of the ways to induce positive learning experiences and let learners discover new insights about spaces that they are visiting for the first time.

ECO-STEWARDS FOR LIFE

Aik Ling emphasizes how the immersive learning programme is aligned to the national science and geography curriculum.

"An informal learning experience such as this allows students to connect knowledge gained in classrooms to real-world environmental issues," she says.

She hopes that when the project ends in 2024, it can be scaled to more schools.

"More than just wanting students to develop an appreciation and care for the environment, we also want to develop them as eco-stewards for life who are empowered to take personal and collective actions in tackling environmental issues," she affirms. ∎

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ABOUT THE INTERVIEWEE

Tan Aik Ling *is Associate Professor with the Natural Sciences and Science Education Academic Group at the National Institute of Education. She teaches biology education methods courses and courses related to integrated STEM curriculum. Prior to teaching at NIE in 2007, she taught Biology and Lower Secondary General Science at River Valley High School for 10 years. Her current research interests lie in the areas of students' ideas of science learning, science teacher professional development and STEM education.*

A MULTIDISCIPLINARY APPROACH TO SUSTAINABILITY EDUCATION

Selected as one of the pilot schools for the Eco Stewardship Programme, Commonwealth Secondary School (CWSS) has adopted a dynamic approach that aims to seamlessly weave sustainability into the very fabric of its academic and cultural life. *SingTeach* talks to three teachers from CWSS who share about the school's various sustainability initiatives that include the STEM elective as well as the "Farm to Table" programme.

INTEGRATING THE 4Cs

Commonwealth Secondary School's (CWSS) Green Plan plays an integral role in the school's effort to build and maintain a culture of sustainability.

"The Green Plan outlines CWSS' vision to make sustainability a core value of the school," Mr Jacob Tan, a Senior Teacher/Biology and teacher-in-charge of the Eco Club at CWSS, says. "The plan is driven by the 4Cs of Campus, Curriculum, Culture, and Community."

He highlights the interconnected relationships between the 4Cs. For instance, the school's various eco habitats, such as the wetland and rainforest, are deeply rooted in what students are learning in geography lessons—an important factor in developing student's interest in conserving the environment.

"Students have the opportunity to be outdoors and observe the different canopy layers of the rainforest as well as experience collecting water for water quality testing at the wetlands. Not only that, there is also a plant nursery where students can be involved in germinating seeds of endangered forest trees," he shares.

The school has also seen the introduction of 1744 solar panels around the campus, which meets 50% of the school's monthly energy demand, as well as six food digesters which recycle food waste. The culture of sustainability embedded in the school has meant the elimination of plastic straws and selling bottled drinking water too.

"Sustainability has become a top principle when designing any programme or activity," Mr Simon Lew, Subject Head/Citizenship and Character Education at CWSS, adds.

Jacob remarks that CWSS has been consistently striving to improve its efforts in integrating the concept of sustainability across subjects, disciplines, departments and even school culture. The school's STEM elective and Farm-to-Table programmes are two examples of how the school is adopting a multidisciplinary approach to sustainability education.

THE STEM ELECTIVE

Serving as one of two non-examinable elective choices for students in Secondary 3 onwards, CWSS' unique STEM elective allows students to explore modern issues, including biodiversity conservation, food resilience and climate change, beyond traditional textbooks.

"The STEM elective is conceptualized as a hotbed for nurturing future scientists and innovators who are passionate about addressing and solving environmental challenges," Ms Vinodhini M Selveindran, Subject Head of Science and Research and co-teacher of the STEM elective, explains.

The STEM elective is introduced during the subject option briefing at the beginning of the year for Secondary 3 students and taken in place of the eighth O-level subject. By selecting this elective, students focus on a portfolio-based approach which culminates in a capstone project during Secondary 4.

"The capstone project sees students tackle real-world problems such as those related to the UN sustainability development goals or it could be any environmental issue that that a student is passionate about," she shares.

She gives an example of how students have worked on a recent project that explored ways of converting urine into energy and have attempted to develop a prototype turbine fixed onto the urinal area. Another student is collaborating with National Junior College on a research project that studies the relationships between light conditions, photosynthesis and nutrient absorption when growing hydroponic green spinach.

The elective, she notes, works in partnerships with other organizations such as the National Environment Agency, Singapore Food Agency and the Mandai Wildlife Group too.

"We have linked up with A*STAR in which a researcher from the organization guides our students in their projects. This is rather unique because the students have the opportunity to be exposed to real-life research work," she remarks.

Elaborating on the benefits of the programme, she highlights how the elective is able to break down subject silos and cultivate multidisciplinary thinking that fosters critical and informed thinkers.

"The challenge of individual subjects is that we tend to frame whatever we have learnt according to a single lens. The beauty of this STEM elective is that we are not bound by these single lenses. Instead, we see how all the knowledge we have learnt fits together into one bigger picture," she describes.

Jacob echoes this sentiment. "The STEM elective allows students to gain hands-on experience without overloading them, providing depth that may not be found in other existing subjects. The richness lies in connecting different subjects to address real-world sustainability challenges," he says.

THE "FARM TO TABLE" PROGRAMME

CWSS' "Farm to Table" programme, an initiative under the Eco Stewardship Programme, integrates indoor and outdoor farming experiences into the lower secondary science curriculum. Starting with conventional soil farming in Secondary 1, students progress to high-tech indoor farming in Secondary 2.

"The programme, spanning 6 to 8 weeks, allows students to learn about farming practices," Simon, who is also the programme coordinator, explains.

"During the course of the programme, students learn about photosynthesis and are exposed to the whole process of growing a plant, including germinating,

transplanting and harvesting. Not only that, they also learn about the role technology plays in urban food production," he shares.

He notes how the programme is closely linked to the science curriculum as well as the UN sustainable development goals. Teachers, for instance, regularly engage students in discussing global issues of hunger and food insecurity, and the importance of supporting local produce, making sustainable food choices, and tackling food waste.

"The harvested produce is not put to waste. Students and teachers find ways to celebrate the harvest together, and the produce is used for activities such as in-class cooking during Food and Consumer Education classes, making salads as well as a food source for canteen stalls," he adds.

He makes the observation that due to Singapore's highly urbanized environment, where only 1 percent of land has been allocated to food production, students may have had less opportunities to witness the hard work that goes into planting, cultivating and harvesting crop.

"We want them to think, 'Where does the food on my plate comes from?'" he states. "We want them to think about the different innovative and sustainable approaches to food production, and how urban farming and urban agriculture can play a role in ensuring food security."

CHARTING THE SUSTAINABILITY PATH AHEAD

What does the future hold for CWSS' STEM elective and its Green Plan?

For Vinodhini, she hopes the STEM elective can leverage on the school's partnerships with various organizations.

"We want to leverage our strength in working with our industry partners so that our students can have more opportunities to co-create with researchers in research and development," she shares. "We also have plans to create a repository where all the student STEM projects can be stored and accessed for future reference."

Jacob is encouraged to see students adopting sustainability actions on their own without much nudging from teachers.

"We are on the right track," he affirms. "CWSS' Green Plan mirrors closely to national sustainable initiatives, such as the OneMillionTrees movement by the National Parks Board, the 'City in Nature' vision, which is one of the five pillars under the Singapore Green Plan 2030, and the '30 by 30' goal, which aims to produce 30 percent of local food needs by 2030."

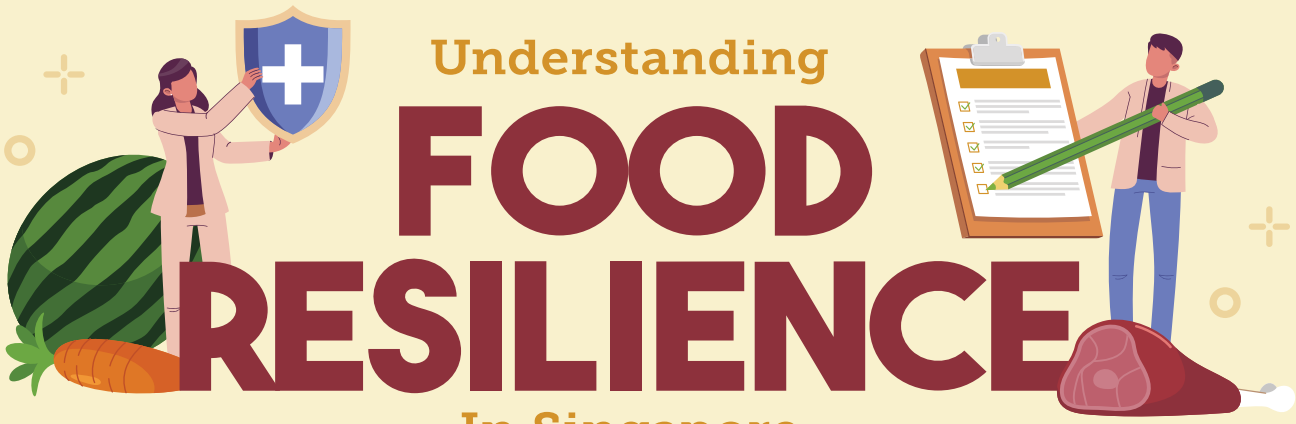
"This gives our students the opportunity to experience those national goals at a micro level and be ready to participate as active citizens in the near future," he adds.

Simon too hopes that the values instilled in students will act as guiding principles as they move on to tertiary education and beyond.

"We aim to cultivate individuals who not only lead successful lives but are also mindful of how their actions can impact the environment, and can actively contribute to a sustainable future," he says.

ABOUT THE INTERVIEWEES

***Jacob Tan** is a Biology Senior Teacher, **Simon Lew** is the Subject Head for Citizenship and Character Education, and **Vinodhini M Selveindran** is the Subject Head for Science and Research at Commonwealth Secondary School.*



Understanding FOOD RESILIENCE In Singapore

Renowned as a food paradise on an international scale, Singapore is home to countless cuisines ranging from street food and heritage dining spots to glamourous celebrity restaurants. According to the Singapore Food Agency, Singapore currently imports more than 90% of our food from more than 180 countries. While this has placed us in first place in the Global Food Security Index for the second year running in 2019, we are also vulnerable to emerging threats such as climate change and biodiversity loss. Dr Johannah Soo, Lecturer of Food and Consumer Sciences at NIE's Natural Sciences & Science Education Academic Group, shares with us her views and findings from her research project on food resilience in Singapore, as well as what more can be done to change society's perspectives on living sustainably.

WHAT IS FOOD RESILIENCE AND WHY IS IT IMPORTANT ESPECIALLY FOR THE YOUNGER GENERATION?

Food resilience looks at how communities and families adapt to food availability, as well as cope with food crises and uncertainties related to the global supply and demand of food. It is closely related to food security, which looks at the availability of food, where the food is sourced from, as well as the resilience and reliability of food distribution networks at a societal level. Food security also considers the consumers' affordability of food, food quality and safety, as well as the country's sustainability and adaptation to impact of climate change.

According to the Singapore Food Statistics 2022 report (Singapore Food Agency, 2022), Singapore imports 90% of our food and 40% of our water. Singapore's local agri-food sector only produces about 29% of eggs, 8% of vegetables and 4% of seafood—far from being sufficient to support local demands. Since we demand food to be imported and are susceptible to external drivers such as the endemic COVID-19 and geopolitical unrest, we are not food secure. For example, food prices have increased sharply in the last few years, creating a lot of stress on consumers. Hence, this poses a threat to household or individual food resilience.

Household food resilience can be measured from two aspects, *Awareness* and *Preparedness*. Awareness refers to having the knowledge on food imports such as impacting factors that contribute to food availability and cost, and the environmental sustainability of the food we consume. Preparedness means the ability to adopt readiness in the event of a food crisis and having access to public and private assistance.

Having a good knowledge of what food resilience is and being ready are important, especially to the younger generation. With the fast depletion of resources and an increasing world population, we need to educate everyone to be cautious of our food consumption. This is especially challenging for Singapore given our limited land and resources for food production. Additionally, as a highly urbanized country with little local agricultural production, people in Singapore may have been less exposed to the agriculture industry. Thus, we also need to accelerate the process of finding new methods to mitigate the situation, such as by employing new agricultural technologies to improve the yield and health of animals and crops.

WHAT SPARKED YOUR INTEREST IN THIS AREA?

Being a Home Economist, I have a mission! We must be an ambassador to advocate sustainable living via the most critical consumption, which is food. Humans need to drink and eat as these are our basic needs and it is important that we consume wisely. My field of study and research revolve around consumers' perception and behaviours, from sensory evaluations and perception of Genetically Modified Food to sustainable food consumption.

CAN YOU SHARE SOME FINDINGS FROM YOUR RESEARCH IN FOOD RESILIENCE?

Before the COVID-19 endemic, I conducted a survey on 600 participants and the results showed that consumers generally want to consume more sustainably. However, they were not keen or able to do certain things such as growing their own food, engage in barter trade, or plan meals according to their dietary guidelines. Many also reported that they had expired food in their pantry and were not buying environmentally-friendly food.

Another study on food waste among secondary and tertiary students showed that the main reason for not finishing the food they ordered and throwing them away was because they did not like the food served. Some lower secondary students reported that they were concerned about their weight and hence refused to finish their serving. The students did not feel "guilty" nor responsible about throwing away unfinished food since only a small amount of food was left.

Nothing is too little to be thrown away—every bit adds up. In 2022, Singapore generated 813,000 tonnes of food waste (Statista Research Department, 2023). Additionally, by not consuming a balanced diet at growing ages, it may lead to health issues or disordered eating in the long run. More could be done to educate students on these misconceptions, including learning more about meal planning, proper food storage and how to eat in moderation, which in turn will help to reduce food wastage.

Another way that the public can help to reduce food waste is to utilize tap water. While many may opt to purchase and drink bottled mineral water, drinking from the tap is generally safe in Singapore. These purchased bottles will add to the amount of waste. Lastly, there is a lack of consumers' knowledge on food storage. For example, "best-before" dates provide an idea of how long the food will last before they lose quality, and they may not necessarily indicate that the food has spoiled. If stored properly, most food products still can be consumed after the "best-before" date.

These results inform us of the urgency to correct misconceptions in consumption, nutrition and health, as well as a need to increase consciousness of their actions.

HOW CAN WE MAKE SOCIETY, INCLUDING STUDENTS, MORE AWARE OF ISSUES CONCERNING FOOD SECURITY?

To increase awareness and in turn, improve preparedness, is more than giving sound information. It takes a lot of effort to change the mindset and habits of consumers. This is a matter of having the right values and beliefs towards sustainable consumption, which will influence their intention and posit actual behaviours.

Environmental studies are already integrated into multiple subjects across various levels and many schools are actively working on environment-related projects for their Applied Learning Programme (ALP). More specifically, sustainable consumption is already included in the upper secondary subject, "Nutrition and Food Science". Additionally, starting 2024, a new subject titled "Food and Consumer Education" will be made compulsory for lower secondary students from almost all mainstream schools.

WHAT IS THE ROLE SCHOOLS CAN PLAY IN EDUCATING OUR YOUNG LEARNERS ABOUT FOOD SECURITY?

Through subjects such as "Food and Consumer Education", "Nutrition and Food Science", as well as others, there is an urgent need to educate our young learners about food security. Schools are the most direct channel to reach out to our young ones, especially in their formative years and youth, so that they will get sound values and information. In turn, these values will lead them to be responsible adults and live sustainably. ■

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ABOUT THE INTERVIEWEE

Johannah Soo *is a lecturer at NIE's Natural Sciences and Science Education (NSSE) Academic Group. She has been in the teaching profession for more than 25 years, from secondary to tertiary levels, specializing in the field of behaviour in sustainable consumption, food science education, and nutrition. She has been involved in syllabus reviews and textbook publication for the subject matter. In research, Johannah's interest includes understanding behaviours and attitudes of different segments of the populations and in turn provide pertinent information for curriculum designs and community interventions.*

A Whole-School Approach to

Sustainability Education

The Eco Stewardship Programme, developed by the Ministry of Education, aims to strengthen current environmental efforts in all schools through the 4Cs of Curriculum, Campus, Culture and Community. Two teachers from Mee Toh School and Tampines Secondary School—both of which are pilot schools in the programme—speak of their experiences in adopting a whole-school approach to environmental education and sustainability efforts.

Eleanor Quek
Subject Head (Total Curriculum) / Environment Education Advisor (EEA)
Mee Toh School

What has been the biggest challenge in teaching students about environmental sustainability?

One of the biggest challenges in teaching students about environmental sustainability is making the topic engaging and relatable to their daily lives. Environmental sustainability is a complex and sometimes abstract concept, which can be difficult for young students to fully grasp. They may not fully comprehend the urgency of environmental issues, the implications of environmentally unsustainable practices and the longer-term consequences of their actions. Overcoming these challenges requires helping them understand and relate to environmental causes in ways that resonate with them. In Mee Toh School, our school culture for environmental sustainability is built through our school-based environment curriculum, leveraging and engaging the wider community in environment efforts, and focusing our attention in curating an immersive environment within our school campus.

Our school's Applied Learning Programme is called "Appreciation, Awareness and Action for Eco-Citizens@Mee Toh School". We also have a programme called "Interdisciplinary Project Work and Values-in-Action (IPW-VIA)" which brings together related environmental topics from various subjects so that our young students can make meaningful connections and extensions to what they learn about the environment. We educate and challenge our students to empathize with real-life environmental issues and design sustainable solutions for the environment. For example, after learning about the challenges posed by urban living to the wildlife population, our students designed fauna hotels. After learning about our existential challenges in ensuring water sufficiency, our students designed ways to recycle water using the scientific principles they have learnt.

How does the infrastructure at your school create an immersive learning environment and help to instil lifelong eco-conscious habits in students?

Eco-stewardship starts from students' advocacy for the environment. Our school, for example, adopts a whole-of-school and whole-of-community approach to recycling. On Wednesdays, also known as "recycling day", Environment Ambassadors from each class, together with their form teachers, guide their fellow classmates to sort out their recyclables. Volunteers from the Parent Support Group also help to guide students in these weekly recycling efforts. Through such sustained practices, our students develop eco-conscious habits that they can practise both inside and outside of school, and are empowered to influence others, like their family members, to make simple adjustments for greater eco-friendliness. Environment Ambassadors who are keen to do more for the environment have the opportunity to become Environment Champions who advocate for environmental sustainability at their level and in the school in other ways. Students who are keen to

learn more about the environment can also take part in co-curricular activities such as the Nature Lovers Club or the Environmental Science Club.

We are conscious in making environment-friendly decisions, such as the progressive installation of LED lights and the use of more energy-efficient models of electrical appliances, such as inverter air-conditioners and sensors for lights in the toilets. Sensors are installed at taps and water coolers to reduce the wastage of water. In 2021, solar panels were installed on the school's rooftop—an effort supported by MOE. Green spaces and gardens dot the school landscape while eco-trails have been designed for students to appreciate nature and biodiversity. Our students, too, grow and harvest vegetables and mushrooms within the campus. In our most recent partnership with the Punggol Shore Urban Farm, our students were able to learn more about sustainable farming from the urban community farmers.

There is an adage, "It takes a village to raise a child." We believe that it requires the collective effort of a whole community to nurture a generation of eco-stewards. It is a meaningful journey and we are grateful to have strong support from like-minded partners within the community in our bid to educate our youth about Mother Earth. There is no doubt that we will constantly strive to give our best.

Preeti Sheri
Head of Department, Character and Citizenship Education
Tampines Secondary School

How are environmental concepts integrated in the CCE curriculum?

Our goal is for Tampinesians to be "**T**he **P**assionate **S**ustainability **S**tewards **(T.P.S.S.)**" who are role models for a zero-waste nation. Our CCE environment literacy programme uses the school's "**A**uthentic, **E**xperiential and **C**ollaborative **(ACE)**" approach, and features a year-long project thematically aligned to Earth Day. For example, the theme for 2023 was, "Invest in Our Planet, Live Sustainably".

Each cohort has a focused theme that is coherent with what they study in the academic year.

- Secondary 1: Positive Energy & Biodiversity
- Secondary 2: Food Waste
- Secondary 3: E-Waste
- Secondary 4 and 5: Global Efforts in Sustainability

Our pedagogies allow for student voice and agency through activities such as gamification, learning through the arts, talks by industry experts, partnerships with sustainable organizations and experiential activities. In addition, collaboration with the Music, Art, Literature and Geography units allow creative expressions in addressing environmental challenges.

How does the school nurture a culture of sustainable habits so that those habits extend beyond the classroom into students' daily lives, and may even influence the community? Perhaps you can highlight some successful projects/ programmes that showcase these aspects.

There are plentiful opportunities to promote "green" conversations and practices in our school. We focus on two pillars of the Singapore Green plan: "Sustainable Living" and "City in Nature" as well as the 4Cs of MOE's Eco Stewardship Programme as planning parameters.

1. Our Applied Learning Programme (ALP) exemplifies innovative, sustainable practices such as upcycling plastic waste into 3D printer filaments.
2. We organize an annual Green Week with activities such as:
    - Eco-Warriors Amazing Race
    - A tote bag design competition that showcases "Tammy the Whale" and emphasizes messages such as "Buy Just Enough"
    - A "Sus-Fashion Booth" in which pre-loved items can be donated or collected
3. Physical spaces become gathering places for experimentation. The Butterfly Lodge allows for nurturing biodiversity and smaller eco-gardens to grow food crops that are donated to seniors in the community. Students are taught how to rear caterpillars and release them as butterflies. They also learn about the challenges of growing vegetables such as *chye sim*.
4. Green Ambassadors armed with knowledge and advocacy skills contribute both within and beyond school.
5. A "Plant-a-Table" initiative by Mathematics teachers in which teachers role model upcycling possibilities.
6. Believing that teachers are key to culture building, all departments share their annual green initiatives. Every department has their own green initiative that they share during staff contact time. This includes the learning trail to Botanic Gardens by English teachers, as well as reflections on the closed loop ecosystem after an eco-farm tour to a black soldier fly facility organized by the Humanities Department.
7. Partnership with Temasek Polytechnic's School of Design encourages students to critically address household waste. The theme for the Secondary 1 Values in Action (VIA) programme is "Sustainability". Students learn about sus-fashion and recycling from Temasek Polytechnic lecturers and create their own products. ■

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We welcome any questions you would like our NIE researchers to answer. Send them to us by scanning the QR code below!

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