

# Empowering STEM Education Professionals Programme 20/21



An Institute of



**NANYANG  
TECHNOLOGICAL  
UNIVERSITY**  
SINGAPORE



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# FOREWORD

The inaugural Empowering Science Education Professionals Programme (ESEPP) was organised by meriSTEM@NIE with the generous sponsorship of ExxonMobil. This programme aims to provide a platform for teachers who are interested in integrated STEM education to showcase their lesson ideas. Through a workshop, competition, and presentation, we hoped to gather a community of like-minded teachers to share STEM lesson ideas with one another.

In this first ESEPP, we were delighted to receive 20 entries from primary and secondary schools across Singapore. Teams of teachers proposed creative and meaningful lesson ideas on the theme of Sustainable Energy. The judges were most impressed with the high quality of the entries. After much deliberation, we picked four winning entries, two from primary schools and two from secondary schools.

This booklet includes the ideas from all the entries. We hope that through sharing these ideas, more teachers will be inspired to adopt integrated STEM learning with their students. We hope that the ideas here will motivate you to share your ideas with others in the community as we work together to build a robust integrated STEM education.

Thank you.

## **Associate Professor Tan Aik Ling**

Deputy Head (Teaching and Curriculum Matters)  
Natural Sciences and Science Education Academic Group  
Core Team Member, meriSTEM@NIE  
National Institute of Education, Singapore

# Empowering STEM Education Professional Programme

## BACKGROUND

meriSTEM@NIE aims to lead and catalyse STEM (science, technology, engineering and mathematics) education research, teaching and partnerships in Singapore so that future generations of educators, learners, and citizens are able to harness relevant STEM knowledge and skills in addressing current and emerging challenges for self and others.

It organises the Empowering STEM Education Professionals Programme (ESEPP) to enhance the quality of STEM literacy; build a community of STEM educators in Singapore; encourage more pervasive adoption of STEM education in schools located in Singapore; and build partnerships between schools, NIE and industries for STEM education in Singapore. The national programme consists of a workshop, competition and sharing session.

ESEPP is open to all primary and secondary school teachers. As part of the competition, participants submit an instructional lesson package based on a theme.

Participants attend a workshop before the competition to understand the principles of designing an instructional lesson package incorporating the elements of STEM.

## ESEPP 20/21

The theme selected for this inaugural ESEPP competition is Sustainable Energy as the availability and accessibility to sustainable energy is fundamental to improving the quality of lives.

A total of 20 teams of teachers from 7 primary and 10 secondary schools submitted their lesson packages for the competition. In the primary school category, there were a total of 9 entries as there were 3 entries from one of the primary schools. On a similar note, there were a total of 11 entries in the secondary school categories as there were 2 entries from one of the secondary schools. All entries were judged in April 2021.

The lesson packages showcased that many teachers are innovative, creative and competent in generating lesson ideas that engaged students to appreciate the necessity for clean and sustainable energy.

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**ExxonMobil**

# WINNERS

## [Primary Category]

**Tan Chor Kheng Christine, Teo Ser Leng,  
Nadiyah Hana Abdul Rahman, Tan Chia Peng**  
GEYLANG METHODIST SCHOOL (PRIMARY)

*Let's design the best greenhouse solution for our school to grow food!*

**Goh Ho Laye, Preetha Balagi, Teo Shu Ting Cheryl,  
Tong Jin Yi, Elaine Lew Yi Ling**

WESTWOOD PRIMARY SCHOOL [TEAM C]

*Let's design a solution to produce renewable energy that can charge our phones!*

## [Secondary Category]

**Preeti Kulkarni, Caroline Hew, Chong Khiam Kiat,  
Tay Siew Woon, Sarah Ang En Ling, Mohanajothi Kesavan**  
COMPASSVALE SECONDARY SCHOOL

*Let's reduce our dependence on fossil fuels by designing a device that makes use of renewable energy sources or reduces the use of non-renewable ones!*

**Chan Kuang Wen, Eleanor Tan Shu Min,  
Gabriel Lim Boon Kiat, Qian Kun**  
RAFFLES INSTITUTION

*Let's design a solution that enables us to produce energy from food waste, and another to reduce food waste itself!*

# PARTICIPANTS

## [Primary Category]

**Er Siew Shin, Sarabjeet Kaur, Ivan Ng Yong Leng,**

**Fion Ho, Phua Ei Ling**

ANDERSON PRIMARY SCHOOL

*Let's design an affordable, reliable and sustainable energy system for Ang Mo Kio!*

**Sherlyn Yeo, Nur Syazana,**

**Ng Xin Rong, Yang Yan Qi**

CHIJ (KATONG) PRIMARY

*Let's design a biogas digester to address food wastage in Singapore and generate an alternative energy source in the process!*

**Yap Chong Chieh, Arafah Tajudin,**

**Ahmad Tarmidzi Mohd Kassim, Ang Sian Hong Edith**

EUNOS PRIMARY SCHOOL

*Let's design a sustainable Singapore that meets the needs of a growing population!*

**Tan Chor Kheng Christine, Teo Ser Leng,**

**Nadiah Hana Abdul Rahman, Tan Chia Peng**

GEYLANG METHODIST SCHOOL (PRIMARY)

*Let's design the best greenhouse solution for our school to grow food!*

**Nurul 'Iffa Binte Omar, H. Fazeelathunisa, Diana Mohd Masudi,**

**Wan Juliana Mohd Taib, Naadira Mohamed Ishak**

MADRASAH IRSYAD ZUHRI AL-ISLAMIAH

*Let's design a playground for the school that harnesses and creates affordable and clean energy!*

**Chew Ansheng Victor, Koh Mui Lee Evelyn, R Parvathy,  
Leong Mok Kam, Noor Haidah, Wong You Yi**

ROSYTH SCHOOL

*Let's identify a wastage or energy-related problem and design a solution that addresses it!*

**Joel Ong, Long Miaw Ying,  
Macus Quek, Dawn Sia**

WESTWOOD PRIMARY SCHOOL [TEAM A]

*Let's design a car of the future that harnesses the power of renewable energy sources!*

**Hiew Li Tiang, Naseema Beevi,  
Boo Hongrui, Ngiam Wei Ling Melissa**

WESTWOOD PRIMARY SCHOOL [TEAM B]

*Let's design a carbon neutral canteen for our school!*

**Goh Ho Laye, Preetha Balagi, Teo Shu Ting Cheryl,  
Tong Jin Yi, Elaine Lew Yi Ling**

WESTWOOD PRIMARY SCHOOL [TEAM C]

*Let's design a solution to produce renewable energy that can charge our phones!*



# PARTICIPANTS

## [Secondary Category]

**Michelle Boo, Jennie Tan, Andy Lee,  
Wan Yew Boon, Sandra Ong, Kuah Ee Qiang**  
CHIJ ST. NICHOLAS GIRLS' SCHOOL

*Let's design a sustainable mobile phone charger!*

**Preeti Kulkarni, Caroline Hew, Chong Khiam Kiat,  
Tay Siew Woon, Sarah Ang En Ling, Mohanajothi Kesavan**  
COMPASSVALE SECONDARY SCHOOL

*Let's reduce our dependence on fossil fuels by designing a device that makes use of renewable energy sources or reduces the use of non-renewable ones!*

**Chen Shunfa, Low Xin Tian, Jessica Goh,  
Ng Jie Li Jeffrey, Lee Jin Meng**  
DUNMAN HIGH SCHOOL

*Let's learn about sustainable energy and investigate how it can help combat climate change!*

**Adeline Yong Yean Pin, Jeffrey Jefferson Gafar, Chew Hock Chye,  
Chow Weiliang Joshua, Loi Yen Siew**  
DUNMAN SECONDARY SCHOOL

*Let's design a solution to naturally cool offices in Singapore!*

**Ong Wee Kwang, Rishabh Talwalkar,  
Xu Kaibin, Lam Yao Lun**  
KENT RIDGE SECONDARY SCHOOL

*Let's design an energy efficient cooling solution for our classroom!*

**Seow Nianjia, Ho Jun Hao Kenneth,**

**Chong Ai Lin, Lim Jia Hui**

NUS HIGH SCHOOL

*Let's investigate how we can harness the power of hydrogen as a source of sustainable fuel!*

**Chua Siew Hui, Jacqueline Chee Danjie,**

**Fazari Othman Muhammad, Chia Teck Seng**

QUEENSTOWN SECONDARY SCHOOL

*Let's design a waste harnessing system to help needy families improve the energy efficiency in their homes!*

**Chan Kuang Wen, Eleanor Tan Shu Min,**

**Gabriel Lim Boon Kiat, Qian Kun**

RAFFLES INSTITUTION

*Let's design a solution that enables us to produce energy from food waste, and another to reduce food waste itself!*

**Mohamad Fadzrun Bin Adnan, Ang Jia Wei,**

**Tan Boon Hock Jeremy, Shawn Kwek Liang Wei**

TECK WHYE SECONDARY SCHOOL [TEAM A]

*Let's design an energy efficient building for Singapore!*

**Huang I Lung, Shelley Chan Hiang Ming,**

**Ang Jia Wei, Tan Boon Hock Jeremy**

TECK WHYE SECONDARY SCHOOL [TEAM B]

*Let's harness the use of sustainable energy to improve our school's aquaponics farm!*

**Tan Jun Hong, Poh Wei Beng,**

**Rozianna Mohammed Affendi, Yeo Li Min Anna**

ZHONGHUA SECONDARY SCHOOL

*Let's identify a wastage problem in Singapore and design a solution to address it!*

# Acknowledgements

We wish to show our appreciation to ...

ExxonMobil for their generous support and partnership in this event. Additionally, it was an eye opener for many of us to hear about your work.

Our colleagues from NIE who have so generously given their time and effort to help with the organization of the event. We appreciate your patience in explaining all the workflow processes to us.

Our judges for taking time to read, comment and judge the entries. We hope you enjoyed the process.

The participating teams of teachers. Your belief in your ideas, your love for your profession and your thirst for continuous improvement is contagious! Without you, this event would not have been possible.

Thank you, everyone!

Visit <https://nie.edu.sg/meristem> to find out more.