



**WORKSHOP ON TEACHING TO TRANSFORM: 21st CENTURY SKILLS AND DESIGN
THINKING IN STEM CONTEXTS**

13-16 November 2018

SEAMEO Hall, SEAMEO RECSAM

Organised by

SEAMEO RECSAM, Penang, Malaysia

In Collaboration with

Faculty of Education, Monash University, Victoria, Australia

Background and Rationale

SEAMEO RECSAM has long recognised and took cognizance of the impact of STEM in the educational systems of the SEAMEO Member Countries. Various projects, training programmes, workshops, conferences and other activities have been implemented by the Centre as reflected in its 10th Five-Year Development Plan FY 2015/2016-FY 2019-2020. In fact, the SEAMEO Basic Education Standards (SEA-BES) Common Core Regional Learning Standards in Science and Mathematics (CCRLSSM 2017) included STEM in its goals and objectives as well as learning standards and indicators to promote and enhance STEM in SEAMEO Member Countries. The CCRLS in Science and Mathematics will be used as reference in the selection of topics and standards in developing STEM modules. The SEA-BES project is aligned with the SEAMEO Agenda Priority #7 “Adopting a 21st Century Curriculum” which states “to pursue a radical reform through systematic analysis of knowledge, skills, and values needed to effectively respond to changing global contexts, particularly to the ever-increasing complexity of the Southeast Asian economic, socio-cultural and political environment, developing teacher imbued with ideals in building ASEAN Community.”

STEM which stands for Science, Technology, Engineering and Mathematics (STEM) approach had been embraced by the SEAMEO Member Countries in their educational systems for a host of reasons such as improving students’ literacies in mathematics, science and technology, increasing students’ interest to pursue careers in STEM-related fields, and developing 21st century work-force. STEM education is a model of interdisciplinary and transdisciplinary teaching and learning that bridges the gap between scientific knowledge and pedagogical application. It is the integration of a design concept of technology and engineering into the teaching and learning of mathematics.

Along this line, RECSAM under its flagship project SEAMEO Basic Education Standards (SEA-BES), in collaboration with the Faculty of Education, Monash University, Australia, will embark on a two-pronged project activity – research component and capacity building component.

Methodology

For the research part, subject specialists, teachers, and student teachers’ cognition and learning will be explored as they collaborate and engage in STEM curriculum design workshop. At the workshop participants will be asked to complete a survey and be interviewed in relation to their experience with STEM. Information would include content knowledge, technological pedagogical content knowledge, confidence in using STEM approach, and perceived barriers and challenges faced as well as enabling factors for the success of STEM in their classrooms. For the capacity- building, participants will acquire knowledge, skills and values in the areas of STEM theory, STEM models, STEM planning framework and transdisciplinary inquiry-based learning sequences to design and develop STEM-based curriculum. The participants’ learnings and outputs will be monitored and explored as they develop lesson sequences as well as a STEM planning framework to be shared throughout the SEAMEO region.

Objectives of the Workshop:

At the end of the workshop, the participants should be able to:

- Gain knowledge and understanding on inquiry- based practices, 21st century skills, design thinking, and transdisciplinary inquiry-based learning and how these are related to STEM;
- Use scientific and mathematical thinking skills in performing challenging tasks and exercises;
- Apply approaches and strategies in developing learning sequences following STEM planning framework; and
- Gather suggestions and recommendations on the Way Forward for the SEA-BES Phase 2 – STEM project

Participants:

Science, mathematics, technology, engineering professors, lecturers, educators from colleges and universities, teachers from primary, secondary, polytechnic and vocational schools within Malaysia as well as Southeast Asia and beyond, curriculum/education specialists from the 11 Ministries of Education of SEAMEO Member Countries, specialists from SEAMEO sister-centres, National Science and Mathematics Centers, and SEAMEO Secretariat

Date and venue:

13 -16 November 2018 (Tuesday – Friday)
SEAMEO Hall, SEAMEO RECSAM, Penang, Malaysia

Organiser:

SEAMEO RECSAM, Penang, Malaysia

Collaborating Partner:

Faculty of Education, Monash University, Victoria Australia

Schedule of Activities

| Time | Activity |
|--|--|
| Day 0 (Monday, 12 November 2018) | |
| 0830-1700 | Arrival and Check in of Participants at RECSAM International House |
| 1400-1700 | Colloquium for Malaysian Teachers and Student Teachers (SEAMEO Hall /Science Lab 2 Topic 1: Design of a Transdisciplinary Inquiry-based Learning Sequence <ul style="list-style-type: none">• Topic 2: Where is Math, Engineering, Arts? (Facilitator, Prof. Gillian Kidman, Prof. Roland Gesthuizen, & Dr. Hazel Tan, Monash University, Australia and Dominador Mangao, SEAMEO RECSAM) |
| Day 1 (Tuesday, 13 November 2018) | |
| 0800 – 0830 | Registration |
| 0830 – 0930 | Brief Opening Programme <ul style="list-style-type: none">• Opening Remarks by Centre Director of SEAMEO RECSAM |

| | |
|--|---|
| | <ul style="list-style-type: none"> • Message by SEAMES Director (Dr. Gatot Hari Priowirjanto) • Outline of aims and objectives of the workshop (Dominador Mangao) |
| 0930-1030 | <ul style="list-style-type: none"> • STEM Education in Thailand: Institute of the Promotion of Teaching Science and Technology (IPST) Experience • Country Presentations- STEM Integration in K-12 Education: Status, Challenges, Prospects, and an Agenda for Research” by MOE Representatives (15 min/country) |
| 1030-1100 | Group Photo and Tea Break |
| 1100-1300 | Country Presentations continued <ul style="list-style-type: none"> • SEAMEO Plenary- Status, Challenges, Prospects and an Agenda for Research (Hazel Tan) |
| 1300-1400 | Lunch Break |
| 1400 - 1630 | Hands-on Introductions Activity1, Challenge 1(Roland Gesthuizen, Gillian Kidman & Hazel Tan) STEM Plenary – Activities and Challenges in STEM: the significance of a name (Roland Gesthuizen) |
| 1630-1700 | Tea Break |
| Day 2 (Wednesday, 14 November 2018) | |
| 0830-1030 | STEM Theory Plenary- Transdisciplinary thinking & inquiry-based practices (Gillian Kidman) STEM Tutorial <ul style="list-style-type: none"> • Design Thinking and STEM Education (Roland Gesthuizen) Wicked Problems (Roland Gesthuizen) The ‘M’ in STEM (Hazel Tan) 21st Century Skills (Gillian Kidman) • The interwoven nature of STEM pedagogies (Gillian Kidman) |
| 1030 - 1100 | Tea Break |
| 1100 - 1300 | Exercise1 (re-focusing task) (Roland Gesthuizen) Introducing ‘Educational Purpose’ and Values (Dominador Mangao, Gillian Kidman, Roland Gesthuizen & Hazel Tan) <ul style="list-style-type: none"> • Standards Plenary - Common Core Regional Learning Standards in Science and Mathematics (CCRLSSM)(Dominador Mangao) • STEM Education Models from the literature (Gillian Kidman, Roland Gesthuizen & Hazel Tan) Where is Math, Engineering, Arts? (Roland Gesthuizen & Hazel Tan) Inquiry-based analysis via a Design Thinking Approach (Descriptive, Evaluative, Interpretative) (Gillian Kidman) Small group canvas design (Roland Gesthuizen) |
| 1300-1400 | Lunch Break |
| 1400 - 1630 | Challenge Part 1- Issues, Problems and Challenges (Roland Gesthuizen, Gillian Kidman & Hazel Tan) Reimagining ‘Educational Purpose ‘ <ul style="list-style-type: none"> • The essence of STEM education for delivering CCRLSSM and associated Values (Dominador Mangao, Gillian Kidman, Roland Gesthuizen & Hazel Tan) HEX Mapping Keywords |
| 1630 - 1700 | Tea Break |

| | |
|-------------|--|
| | Day 3 (Thursday, 15 November 2018) |
| 0830 - 1030 | Exercise 2 (re-focusing task) (Roland Gesthuizen) Construction of the STEM Planning Framework (Part 1)(Gillian Kidman, Roland Gesthuizen, Hazel Tan & Dom Mangao) <ul style="list-style-type: none"> Manipulation of keywords Small group canvas design Small group presentation |
| 1030 - 1100 | Tea Break |
| 1100 - 1300 | Construction of the STEM Planning Framework (Part 2) (Gillian Kidman) Small group presentation Q&A of pitch ideas <ul style="list-style-type: none"> Construction of Draft STEM Planning Framework (Gillian Kidman) Planning Guide |
| 1300-1400 | Lunch Break |
| 1400-1630 | Challenge Part 2 <ul style="list-style-type: none"> Planning the Learning Sequence(Gillian Kidman, Roland Gesthuizen & Hazel Tan) To trial and finalise the Draft STEM Planning framework To include CCRLSSM and values To be based around Design Thinking Approach (research, empathise, ideation, prototype, presentation) and Inquiry-based practices Student teacher exemplar |
| 1630 - 1700 | Tea Break |
| | Day 4 (Friday, 16 November 2018) |
| 0800 - 1030 | Challenge Part 3 <ul style="list-style-type: none"> Planning the Learning Sequence continuation (Gillian Kidman, Roland Gesthuizen & Hazel Tan) |
| 1030 - 1100 | Tea Break |
| 1100 - 1230 | <ul style="list-style-type: none"> Finalising the Transdisciplinary Inquiry-based Learning sequence (Dominador Mangao, Gillian Kidman, Roland Gesthuizen, & Hazel Tan) Sharing of Transdisciplinary Inquiry-based Learning Sequence (Roland Gesthuizen) Closing Plenary - STEM Planning Framework (Gillian Kidman) Where is Math, Engineering, Arts?(Roland Gesthuizen) Next Steps for participants (Dominador Mangao) Closure of the workshop and Certificate Presentation (Dominador Mangao) |
| 1230 - 1400 | Lunch Break |
| 1400-1900 | Educational Tour of Georgetwn UNESCO World Heritage Sites (Note: Educational tour is free-of-charge for SEAMEO MOE representatives and consultants. Other participants are invited to join the tour but need to pay tour fee.) |
| 1900 - | Home Sweet Home |

This programme schedule may be subjected to changes without prior notice.

Workshop Registration Fee and Types of Participants:

| Type of Participant | Type of Registration Fee and Accommodation at RECSAM International House (per participant) | | |
|---|---|-----------------------------|-------------------------------|
| | Type 1 (Without Accommodation) | Type II (Twin-sharing) | Type III (Single occupancy) |
| 1. Ministry of Education – RECSAM-sponsored (free of charge) | | MOE –RECSAM sponsored | |
| 2. Fee-Paying Participant: Professionals Category- (professors, lecturers, specialists, teachers, education officers etc. | RM 735.00 (US \$ 190.00) | RM 985.00 (US \$ 260.00) | RM 1,235.00 (US \$ 325.00) |
| 3. Fee-Paying Participant: Students Category - (University students, college students, student teachers/ interns, etc. | RM 510.00 (US \$ 135.00) | RM 760.00 (US \$ 200.00) | RM 1,019.00 (US \$ 270.00) |

**Students are to provide student card or official letter from institution as a proof.*

Payment Mode

- a. For payment via Cheque / Local Order / Postal Order:
Pay to: SEAMEO RECSAM

- b. For internet banking:

Pay to: SEAMEO RECSAM
Bank: Maybank Gelugor Branch, Penang
Account Number: 5571 5700 0647

- c. Payment via Telegraphic Transfer
Payable to: SEAMEO RECSAM
Bank Account No. 557157000647
Account Type: Current Account
SWIFT Code: MBBEMYKL
Bank Name: Malayan Banking Berhad,
Address: 345-H, Bangunan Kelab Gelugor, 11700, Gelugor, Penang.

Workshop Fee Coverage

The workshop fee covers the cost for workshop materials, certificate and meals during the workshop for each participant from 13 – 16 November 2018. The registration fee for the official RECSAM-sponsored two MOE representatives and consultants is waived.

Educational Tour

Official RECSAM-sponsored two MOE representatives and consultants may join the educational tour for free. However, other participants are invited to join the tour for a minimal fee and will only be collected on the actual day of the event with accompanying receipt.

Food and Accommodation at RECSAM International House:

For Type II and Type III participants boarded at RECSAM International House, breakfast and dinner will be served. Official RECSAM-sponsored two MOE representatives are free of charge.

Check-in time on 12 November 2018 (Monday) from 2.00pm onwards

Check-out time on 17 November 2018 (Saturday) before 12.00pm

Breakfast will be served at RECSAM Café from 13 to 17 November 2018

Dinner will be served at RECSAM Café from 13 to 15 November 2018

Online Registration

You may register to this workshop via SEAMEO RECSAM website (www.recsam.edu.my) under the Programmes | Courses | Workshop field

Submission and Closing Date

Confirmation of attendance and submission of Participation Form should be done on or before **19 October 2018** to

Director
SEAMEO RECSAM,
Jalan Sultan Azlan Shah,
11700 Gelugor, Penang.

by Fax at 604-6522737 or email: jenny@recsam.edu.my / tiana@recsam.edu.my / dom.mangao@gmail.com


For Enquiries


Ms. Jenny Ong: +6046522761 (jenny@recsam.edu.my)


Ms. Tiana Mohamad: +6046522764 (tiana@recsam.edu.my)


Mr. Dominador D. Mangao: +6046522760 (dominador_mangao@recsam.edu.my / dom.mangao@gmail.com)

Profile of Facilitators

| | |
|---|--|
|  | <p>Gillian Kidman is an Assoc. Professor of Science Education at Monash University. She has research and teaching interests in science and mathematics, with particularly interested in inquiry-based processes, and the potential inquiry has for the integration of science with other disciplines – the development of STEM. She is currently working on the transdisciplinary nature of STEM inquiry with those who work in STEM careers as well as STEM teachers. Gillian’s research, teaching and curriculum design is award winning at both the State and National levels in Australia, and is a sought after International speaker. Gillian was a Lead Writer and Senior Advisor of the <i>Australian Curriculum: Science</i>, and <i>Australian Curriculum: Biology</i>. Her specific contributions were in the <i>Science Inquiry Skills</i> strand of the curriculum.</p> |
|---|--|

| | |
|--|--|
|  | <p>Roland Gesthuizen is a STEM Method Lecturer at Monash University, Melbourne and Vice President of the Mag-Net association for STEM Educators and Editor for the <i>DLTV Digital Learning and Teaching Victoria Journal</i>. His research and teaching interests cover Science and Technology with particular interest in the Digital Origins of STEM, Science Education, Digital Technologies in the Secondary Curriculum and supporting pre-service teachers. He is currently working on the Cognitive and Conative domains of STEM examining how we teach to inform, and teach to transform. He has grounded his teaching practice in his professional experience working as a research scientist with ICI Australia (Orica) for the mining, organic chemicals and animal health divisions at the Central Research Laboratories. As an Internet pioneer, he was the first to help design and build a website for an Australian public utility and operated an EarthDial used with the NASA Mars Rovers for the Planetary Society. Roland’s work has been recognised with a <i>National ACCE Educator of the Year Award</i> and an <i>ISTE Making IT happen award</i>.</p> |
|--|--|

| | |
|---|---|
|  | <p>Dr. Hazel Tan is an academic at Monash University and part of the Mathematics, Science and Technology Academic Community. Her areas of research and teaching interest are in secondary mathematics education, educational technology, and international comparative studies. Her research methodological expertise is in quantitative and mixed methods and her work on Facebook as a recruitment tool for research has gained academic interest. Before moving into academia, Dr. Hazel worked as a senior secondary mathematics teacher and head of mathematics department, and as an educational technology officer for the Ministry of Education Singapore. This prior experience provided a solid foundation for her current academic work.</p> |
|---|---|

| | |
|---|--|
|  | <p>Dominador D. Mangao is Science Specialist and currently the Acting Deputy Director for R & D Division, SEAMEO RECSAM. He is the project coordinator of the SEAMEO Basic Education Standards (SEA-BES) “<i>Common Core Regional Learning Standards in Science and Mathematics</i>” publication. He is the Chief Editor of the <i>Journal of Science and Mathematics Education in Southeast Asia</i>, and editor of <i>Making Sense of Science Inquiry: Problem-based Learning at Work</i> to name a few. He served as Executive Secretary of the 7th International Conference on Science and Mathematics Education (CoSMEd 2017). His research and teaching interests are in problem-based learning, lesson study, inquiry-based learning, socio-scientific issues-based education, assessment, curriculum and standards development.</p> |
|---|--|



**WORKSHOP ON TEACHING TO TRANSFORM: 21st CENTURY
SKILLS AND DESIGN THINKING IN STEM CONTEXTS**

13 - 16 November 2018

PARTICIPATION FORM



| PARTICIPANT'S INFORMATION | | |
|--|-------------------------------------|--|
| Name: | | Position/Designation: |
| <input type="checkbox"/> Prof <input type="checkbox"/> Dr <input type="checkbox"/> Mr <input type="checkbox"/> Ms <input type="checkbox"/> Mrs <input type="checkbox"/> Mdm <input type="checkbox"/> Other (please specify): | | |
| Country/Office/Address: | | |
| Type of Participant: <input type="checkbox"/> Ministry of Education - RECSAM-sponsored (free of charge) <input type="checkbox"/> Other Educational Institution - fee paying <input type="checkbox"/> Ministry of Education - fee paying | | |
| Office Phone: | Mobile Phone: | E-mail: |
| SPECIAL REQUEST FOR MEALS | | |
| <input type="checkbox"/> No special request | <input type="checkbox"/> Vegetarian | <input type="checkbox"/> Other (please specify): |
| WORKSHOP FEE AND ACCOMMODATION AT RECSAM INTERNATIONAL HOUSE | | |
| <input type="checkbox"/> Type I (Without Accommodation): Professionals - RM 735.00 (US \$ 190.00) Students - RM 510.00 (US \$ 135.00) <input type="checkbox"/> Type II (Twin-sharing room): Professionals- RM 985.00 (US\$ 260.00) Students -RM 760.00 (US \$ 200.00) <input type="checkbox"/> Type III (Single room): Professionals - RM 1,235.00 (US \$ 325.00) Students - RM 1,019.00 (US \$ 270.00) | | |
| The workshop fee covers the cost for workshop materials (notes, stationery and bag), workshop certificate and meals during the workshop for each participant. | | |
| For Type II and Type III participants boarded at RECSAM International House: Check-in time: 12 November 2018 (Monday) from 2.00 PM onwards Check-out time: 16 November 2018 (Friday) or 17 November 2018 (Saturday) before 12.00pm | | |
| PAYMENT MODE | | |
| <input type="checkbox"/> Cash <input type="checkbox"/> Payment via Cheque / Local Order / Postal Order (Payable to SEAMEO RECSAM) <input type="checkbox"/> Internet banking (Pay to: SEAMEO RECSAM, Account Number: 5571 5700 0647) <input type="checkbox"/> Telegraphic Transfer or TT Payable to: SEAMEO RECSAM, Account No. 557157000647 Account Type: Current Account, SWIFT Code: MBBEMYKL Bank: Malayan Banking Berhad, Address: 345-H, Bangunan Kelab Gelugor, 11700, Gelugor, Penang, Malaysia | | |
| Signature of Applicant: _____ | | Date: _____ |
| IMPORTANT NOTICE | | |
| Confirmation of attendance and submission of Participation Form should be done on or before 19 October 2018 to: The Director SEAMEO RECSAM Jalan Sultan Azlan Shah, 1700 Gelugor, Penang. | | |
| by Fax at 604-6522737 or email: jenny@recsam.edu.my / tiana@recsam.edu.my / dom.mangao@gmail.com | | |